Plant Breeding Abstracts

Vol. XXIV, No. 2

C. A. B.
12 APR 1954
FILE

*STATISTICS

763 HAMMING, G.
Het normaal maken van frequentieverdelingen. (**Normalization of frequency distributions**).
Landbouwk. Tijdschr, 's-Grav. 1952 : **64** : 833–45.

A graphical method is described for normalizing frequency distributions, and illustrated with reference to potato grading.

764 BEHRENS, W. U.
Zur Anwendung der Varianzanalyse. (**The application of the analysis of variance**).
Z. Acker- u. PflBau 1953 : **97** : 177–80.

In reply to W. Schreiner's comments on the diverse ways in which analysis of variance is being applied in Germany, the author shows that the methods worked out by (1) English writers, and A. Linder and A. Mudra, (2) A. Lein, and (3) the Sortenamt für Nutzpflanzen [Panel for Varieties of Economic Plants] are fundamentally equivalent.

765 GEIDEL, H.
Zur Prüfung von Ertragsdifferenzen mit dem F-Test und mit dem t-Test. (**Testing yield differences with the *F* test and with the *t* test**).
Z. Acker- u. PflBau 1953 : **97** : 181–84.

A set of yield data are discussed in which apparently diverse conclusions as to the significance of yield differences followed from the application of the *F* and *t* tests, respectively.

766 ROY, P. M.
Hierarchical group divisible incomplete block designs with m-associate classes.
Sci & Cult. 1953 : **19** : 210–11.

A class of incomplete block designs, designated hierarchical group divisible incomplete block designs, is introduced, generalizing the concept of group divisible designs of Bose so as to include partially balanced incomplete block designs with more than 2 associate classes. An example is given of nonsingular hierarchical group divisible designs with 3 associate classes.

767 SALMON, S. C.
Random versus systematic arrangement of field plots.
Agron. J. 1953 : **45** : 459–62.

A general critique is presented of the indiscriminate advocacy of random as against systematic field designs. It is pointed out that, whereas random arrangements may be desirable where suspicion of personal bias might arise or for theoretical statistical studies, they may be inconvenient, too expensive, and introduce new sources of error, in particular real errors of considerable magnitude. It is emphasized that practical recommendations are hardly ever made from the results of single statistically designed experiments, and they do not depend, to any great extent, on statistical interpretation of the data.

768 KUIPER, N. H. & KORSTEN, L. C. A.
Open plaatsen in variantieschema's. (**Missing plots in variance lay-outs**).
Meded. LandbHoogesch., Wageningen 1953 : **53** : 25–30.

A missing-plot technique for 2-way classifications, in which vector notation is used, is described.

769 RUNDFELDT, H.
Die Prüfung der wichtigsten Verfahren im Feldversuchswesen an Hand von Modellen. (**The testing of the most important procedures in field experimental work by means of models**).
Z. Pflanzenz. 1953 : **32** : 301–54.

A model experiment was devised to ascertain the effect of size and shape of plots, arrangement of plots in the blocks, direction of the main fertility gradients and different methods of calculation in field trials involving a small number of varieties. A method of analysis giving variances within treatments is compared with analysis of variance. Calculation of variances within plots of different sizes and shapes indicated the importance of the direction of rectangular plots. Standard errors are calculated for the methods of analysis devised by Linhard, Mitscherlich, and for the methods of randomized blocks, the Latin square, and

* General studies, see also individual crops.

complete randomization. The first two are alternative methods of analysis of the same systematic design. Amongst all the methods the Linhard has the smallest standard error, 2·5, against 3·0 for the randomized block analysis, when the real random error is 2·0.

770 DALENIUS, T.
Något om metoder för objektiva skördeberäkningar. (Concerning methods for objective estimations of crop yields).
K. LantbrAkad. Tidskr. 1953 : **92** : No. 2–3 : 99–118.

This paper is devoted largely to consideration of a sample plot technique, modified to introduce measures of (*a*) carefulness in harvesting by the farmer and (*b*) the loss per unit area, i.e. the difference between the biological yield and the harvested yield. The problem of estimating the potato crop is separately discussed. In two appendices, applications of the method on a national basis in Sweden are considered.

*GENETICS

771 HAGEDOORN, A. L.
Samenwerking en verband tussen de gebieden van de genetica. **(Collaboration and unity between the fields of genetics).**
Erfelijkh. i. Prakt. 1953 : **14** : 24–28; 35–36.

A plea is made for closer cooperation between geneticists investigating different aspects of the subject. Human, animal and plant genetics should not be separated into exclusive compartments, as each branch can contribute to the others.

772 PONTECORVO, G.
Ninth International Congress of Genetics.
Nature, Lond. 1953 : **172** : 756–57.

Comments are made on the Ninth Congress held during August 1953 at Bellagio, Italy, reasons being given for the author's opinion that this Congress was more successful than the preceding ones. Attention is drawn to certain trends in present-day genetics, detectable at the Congress. Of these may be mentioned the emphasis on functional aspects of the gene, the apparent impasse in microscopic study of the chromosome, except as a branch of comparative morphology, until new techniques and concepts are devised, the considerable interest in quantitative inheritance, and the importance of the study of natural populations, especially of *Drosophila*.

773 GREEN, M. C.
The random distribution of genes on chromosomes.
Amer. Nat. 1951 : **85** : 357–63.

Formulae are derived, by means of the multinomial theorem, for the probable distribution of a given number of genes over a given number of chromosome pairs, assuming that the genes are distributed at random and that the chromosomes are approximately equal in size.

774 CHOVNICK, A. & FOX, A. S.
The problem of estimating the number of loci determining quantitative variation in haploid organisms.
Amer. Nat. 1953 : **87** : 263–67.

Formulae for estimating the number of loci governing quantitative characters in haploids are presented, with special reference to their application to *Neurospora crassa*.

775 LEWIS, D.
A relationship between dominance, phenotypic stability and variability, and a theory of alternative genetic pathways.
Nature, Lond. 1953 : **172** : 1136–37.

In experiments on *Lycopersicon esculentum* the effect of the environment upon the mean flower number, and average dominance and variability of this character was determined in two environments, termed high expression (H E) = 13° C and low expression (L E) = 26° C. It was found that (1) the average dominance was changed by the environment, low number of flowers being dominant in H E and intermediate in L E; (2) the F_1 was more phenotypically stable than the two parents in relation to the two environments, this greater stability being ascribed to the change to dominance effected by an environment which was exerting the opposite influence upon the character to that of the gene; and (3) the relative variability of the F_1, as measured in one environment, was related to the degree of dominance operating with the particular environment and genetic situation, the lowest variability being associated with the minimum of dominance. Some data in the literature suggest that such a relationship between low variability and minimum of dominance may be a general one. This relationship, and that between change of dominance and phenotypic stability, are interpreted by the theory of alternative genetic pathways. This

* General studies, see also individual crops.

hypothesis assumes that, when the different alleles are both operating in a heterozygote, each may operate through a similar but slightly different synthetic pathway, possessing its own particular optimum for an environmental condition. It is further postulated that when an allele is completely recessive, it is not in operation. Thus, the maximum number of alternative pathways will be in a heterozygote that does not show dominance; the high number of such pathways tends to offset the effect of environment, resulting in a lower amount of nongenetic variability. The change in dominance due to environmental differences is attributed to the opening or closing of certain pathways by the environment. The antigenic system of *Paramecium* can also be interpreted according to this theory (cf. *PBA**, Vol. XXII, Abst. 1581). Attention is drawn to the similarity between the concept of alternative genetic pathways and that of alternative biochemical syntheses proposed by Hinshelwood.

776 HARTE, C.
Untersuchungen über die Variabilität der Chiasmenbildung bei *Oenothera*-Bastarden. I. Mitteilung. Die Häufigkeit der Endchiasmen bei Formen mit einem Viererring. (Investigations into the variability of chiasma formation in *Oenothera* hybrids. I. The frequency of terminal chiasmata in forms with a four-membered ring).
Chromosoma 1953 : **6** : 91–114.

The frequency of crossing over in the pollen mother cells of five *Oenothera* hybrids was studied. The frequency of chiasma formation may vary considerably between different groups of pollen cells in the same anther, and from one anther or flower bud of a plant to another.
The genetic constitution of a plant influences the rate of chiasma formation, the alleles *fr* and $+^{fr}$ being particularly important in this respect. The vitality and physiological condition of the plant as a whole, as well as external conditions such as degree of humidity, also influence crossing over.

777 BENNETT, J. H.
Junctions in inbreeding.
Genetica 1953 : **26** : 392–406.

Extending the use of junctions in inbreeding theory, devised by Fisher (cf. *PBA*, Vol. XIX, Abst. 173), the author calculates the typical length of heterogeneous and unbroken homogeneous tracts after n generations of (*a*) selfing, and (*b*) parent-offspring mating. Leading terms are also derived for the map length heterogeneous after n generations of selfing in tetrasomic organisms with and without double reduction. In chromosomes with a high frequency of quadrivalent formation, the heterogeneous chromosome segments become concentrated eventually around the centromere, their total length being independent of the length of the chromosome. A graph is given to show the comparative rate at which homogeneity is obtained after (*a*) selfing, (*b*) parent-offspring mating, (*c*) sib mating, and (*d*) selfing in tetrasomic organisms.

778 CHAO, P. K.
Kappa concentration per cell in relation to the life cycle, genotype and mating type in *Paramecium aurelia*, variety 4.
Proc. Nat. Acad. Sci., Wash. 1953 : **39** : 103–13.

In both the mating types studied (VII and VIII) the heterozygotes and homozygotes for the killer gene K in the micronucleus showed a temporary increase in the number of κ particles per cell during the first two divisions after fertilization. In the course of the following four or five fissions, the number dropped to the level characteristic of the genotype and mating type, this number being maintained until the next fertilization. Genotype KK or Kk of mating type VII had twice the κ concentration characterizing the corresponding genotype of type VIII. Within the same mating type, KK homozygotes possessed twice the amount of κ as Kk heterozygotes.
Change of κ concentration in relation to change of genotype was studied in type VIII. Alteration of genotype from Kk to either KK or kk was accompanied, during the first seven fissions, by no change from the κ concentration typical of Kk killers. In the kk cells, the amount of κ suddenly dropped to low levels or zero after the eighth fission in some cells, and progressively in more and more cells until the fifteenth fission, when κ disappeared from all cells. In new KK cells, however, the concentration of κ rose regularly to the KK level with the ninth fission.

779 NANNEY, D. L.
Mating type determination in *Paramecium aurelia*, a model of nucleo-cytoplasmic interaction.
Proc. Nat. Acad. Sci., Wash. 1953 : **39** : 113–19.

The author postulates that differences between mating types within each variety depend upon

* *Plant Breeding Abstracts.*

gene-dosage differences in the macronucleus, the higher levels of dosage being brought about by the action of a cytoplasmic polyploidizing substance produced under the influence of the original macronucleus.

780 LEVENE, H.
Genetic equilibrium when more than one ecological niche is available.
Amer. Nat. 1953 : **87** : 331–33.

It is shown that it is possible to have a pair of alleles in equilibrium when more than one ecological niche is available and without the heterozygote being superior to either homozygote in any single niche.

781 MOREE, R.
An effect of negative assortative mating on gene frequency.
Science 1953 : **118** : 600–01.

It is shown that changes in gene frequency occur, without the operation of selection as usually defined, when negative assortative mating is operative. Formulae are derived for calculating gene frequencies at a single locus for any desired generation, and a table is given of the frequency of a recessive gene in various generations and for various negative coefficients of assortative mating.

782 MICHAELIS, P.
Das labile Gen *Pallidovariabile* von *Epilobium*, seine Manifestation und Entstehung in verschiedenen Plasmonabänderungen. **(The labile gene *Pallidovariabile* of *Epilobium*, its manifestation and appearance in various plasmon modifications).**
Z. indukt. Abstamm.- u. VererbLehre 1953 : 282–96.

The behaviour of the dominant labile gene *pallidovariabile* (*Pall*), found in certain hybrid progeny of *E. hirsutum* Essen ♀ x *E. parviflorum* Tübingen ♂, is described. The mutation Pall$^+$ → Pall tends to follow upon certain definite plasmon modifications in the cell, whilst the reverse mutation is independent of the plasmon. The appearance of *Pall* is largely dependent upon the interaction of genotype and plasmotype.

783 BARTHELMESS, A.
Mutationsauslösung mit Chemikalien. **(Chemically induced mutation).**
Naturwissenschaften 1953 : **22** : 583–84.

Data on the comparative mutagenic effects of a number of chemicals are tabulated. The experiments were made on *Physcomitrium piriforme*, *Pohlia nutans* and *Bryum caespiticium*, and it is suggested that these and similar mosses are eminently suitable for experiments designed to test the effectiveness of mutagenic substances.

784 WADDINGTON, C. H.
Genetic assimilation of an acquired character.
Evolution 1953 : **7** : 118–26.

A fuller account is given of experiments in which selection for the abnormal phenocopy crossveinless in *Drosophila*, occurring in response to a temperature shock, resulted in the hereditary and environmentally independent condition of this character (cf. *PBA*, Vol. XXII, Abst. 2595). A process of genetic assimilation is described as a possible explanation of the phenomenon. Such assimilation depends on the tendency of selection not merely to increase the frequency of a favoured character, but also to stabilize its development. A similar suggestion has been advanced by Schmalhausen (cf. *PBA*, Vol. XVII, p. 236). The genetic basis of the crossveinless condition is polygenic.

785 FALCONER, D. S.
The problem of environment and selection.
Amer. Nat. 1952 : **86** : 293–98.

The problem of whether selection is best undertaken in the environment in which the improved breed is to live is considered. If two environments are considered, selection of a character in one will lead to a correlated response on transference to the other. It is shown that, though the correlated response may be greater than the direct response, this is likely to be infrequent.

EVOLUTION

786 MADISON, K. M.
The organism and its origin.
Evolution 1953 : **7** : 211–27.

Definitions of an organism and life in the literature and previous hypotheses of the origin of life are critically examined. The author defines life as consisting of manifestations of an organism, and an organism as a group of chemical systems in which free energy is released as part of the reactions and in which some of this free energy is used in the reactions of one or more of the remaining systems. Possible steps are outlined by which life may have originated, first as an organism as defined, through whose diffuse boundaries more and more efficient chemical reactions gradually became incorporated in the metabolism, and finally as a submicroscopic and still diffuse organism, undergoing reactions oxidizing hydrogen sulphide and reducing carbon dioxide, and

containing self-duplicating nucleoproteins or genes and the enzymes synthesized by them, the adenylic acid system of energy transfer and numerous organic intermediates.

787 Seshachar, B. R. & Sunder Lal Hora
Organic evolution.
Sci. & Cult. 1953 : **19** : No. 1 : 21–23.

An account is given of the proceedings of a symposium on organic evolution, held under the auspices of the National Institute of Sciences of India, at New Delhi, in March 1953. The following were among the many papers contributed in person or by proxy.

The history of evolutionary thought in Asia was discussed by Sunder Lal Hora, and in another paper by J. Needham and D. Leslie. J. D. Bernal dealt with the origin of life; Sivatosh Mookerjee, speaking from the standpoint of embryology, expressed the view that only against a background of a matter-energy concept can evolution be understood. B. R. Seshachar discussed the origin of life in terms of genetically-controlled energy systems, outlining the development of genetic systems in the lower organisms, particularly in the ciliates. From J. B. S. Haldane came suggestions on the future of evolutionary studies, with particular reference to India. Both J. Lindsay and P. B. Medawar dealt with some aspects of neo-Lamarckism. Several contributors applied the methods of functional morphology to evolutionary concepts.

Among the papers concerned with polyploidy, E. K. Janaki Ammal discussed the evolutionary significance of polyploidy in *Rhododendron* and other flowering plants, and N. Parthasarathy dealt with the evolution of *Saccharum*. S. P. Ray-Chaudhuri surveyed X-ray-induced chromosomal changes. K. A. Chowdhury considered evolutionary trends in the anatomy of flowering plants.

788 Iljin, M. M.
(The process of evolution of species in angiospermous plants).
Bot. Ž. (Bot. J.), Moskva 1953 : **38** : 215–31. [Russian].

Lysenko's evolutionary theories, founded upon reports of interspecific conversions, are regarded as conflicting with the tenets of Marxism and Soviet Darwinism, and with Lysenko's own earlier dicta on inheritance, variability, natural selection and intraspecific competition. The writer accepts, in broad outline, the explanation of interspecific conversion given by Turbin (cf. *PBA*, Vol. XXIII, Abst. 1634) and supports the latter's contention that no new plant species have evolved by this method. A paper by Potulinskiĭ, in which the occurrence of unproductive *Taraxacum* species is explained by conversion (cf. *PBA*, Vol. XXII, Abst. 2941), is criticized. The writer refers to his own trials with *Taraxacum* spp., in which he failed to observe changes of one species into another. He considers that evolution is a slow continuous process in which taxonomic units of a lower order develop into others and that interspecific changes require periods of many years.

789 Vinogradov, M. P. & Vinogradova, T. V.
(The critical remarks of N. V. Turbin and N. D. Ivanov on the new concepts of the evolution of species).
Bot. Ž. (Bot. J.), Moskva 1953 : **38** : 234–45. [Russian].

Some of Turbin's and Ivanov's arguments against Lysenko's evolutionary theories (cf. *PBA*, Vol. XXIII, Absts. 1634 and 1635) are rejected. In particular they are criticized as having failed (1) to establish that Darwin accepted qualitative changes as an evolutionary force and (2) to prove that evolution is a slow process of cumulative changes without leaps. Moreover, they give no facts in support of their concepts of variability, inheritance, over-population, intraspecific competition, selection and the cumulative effects of acquired changes resulting in divergence or evolution of new varieties or species. Ivanov's statement that Lysenko supports Darwin's concepts of evolution and intraspecific variability is unfounded, and his juxtaposition of Lysenko's evolutionary theories with the mutation theory of formal genetics is regarded as unscientific.

790 Tolmačev, A. I.
(Some questions relating to the theory of evolution of species).
Bot. Ž. (Bot. J.), Moskva 1953 : **38** : 530–55. [Russian].

Lysenko's recent definitions of species and variety are accepted in principle but his claim to have developed a new evolutionary theory capable of supplanting classical Darwinism is rejected. The new data, reported by Lysenko's adherents, on the evolution of several weeds and cultivated plants are regarded as important for the study of evolution. The fact that no new plant species have been obtained in their experiments does not make the findings any less significant theoretically. It is too early to form hypotheses on the basis of present knowledge. The writer suggests that all the new data relating to problems of evolution should be discussed and sets an example by

describing the complex interrelations between the various systematic units in the genera *Papaver* and *Draba* and some other plants.

791 TALJMAN, P. N.
(Questions relating to species and evolution).
Bot. Ž. (Bot. J.), Moskva 1953 : **38** : 556–69. [Russian].

Most of the comments made by Turbin and Ivanov on Lysenko's evolutionary theories (cf. *PBA*, Vol. XXIII, Absts. 1634 and 1635) are accepted. The writer, however, agrees with Lysenko that overpopulation does not occur in nature. It is thought that evolutionary changes in individuals of a species involve characters, some of which are beneficial, others harmful, to the species, and that no interspecific and intraspecific competition or interspecific mutual aid occurs.

792 FOX, S. W.
A correlation of observations suggesting a familial mode of molecular evolution as a concomitant of biological evolution.
Amer. Nat. 1953 : **87** : 253–56.

It is postulated that a limited randomness of biosynthesis in the individual organism tends to confer a selective advantage upon the organism, by reason of the production of some molecules with superior selective value in a given situation and by making possible a versatile response to a changing environment. The chief support for this hypothesis is provided by evidence indicating that molecules from the same organism conform to a sibling type of relationship. It is further suggested that the theory can explain evolutionary relationships shown by groups of organisms with respect to biochemical synthesis.

793 MAYR, E.
Population structure, dispersal and species formation.
Science 1953 : **118** : p. 573. (Abst.).

Attention is drawn to the role of population structure in speciation. Of the several factors upon which this structure depends, the efficiency of dispersal is regarded as the most important.

794 TURRILL, W. B.
Hybrids and evolution in flowering plants.
Sci. Progr. 1954 : **42** : 15–31.

The role of hybridization in the production of new taxa, by means of allopolyploidy, gene recombination and the introduction of genes into a new cytoplasmic environment, is discussed, mainly with reference to examples from the British flora.

795 ZIA-UD-DIN, K.
Hybridization as a factor in species delineation in Spermatophyta.
Pakist. J. Sci. 1953 : **5** : 29–32.

Some classic examples of natural intergeneric and interspecific hybridity are discussed, together with the restrictions imposed upon the recombination of characters in the F_2 by gametic and zygotic elimination and by linkage.

*CYTOLOGY

796 KOSTRJUKOVA, K. JU.
(The question of heterogeneity of male sex cells originating from the same pollen tube).
Bot. Ž. (Bot. J.), Kiïv 1953 : **8** : No. 3 : 16–30. [Ukrainian].

Cytological investigations of pollen grains in angiosperms showed that the vegetative and generative cells differed in shape, mode of development and biochemical interaction. The vegetative cell resembles the primary cell of the pollen grain; the reproductive cell initiates a new cycle of development. One of the male gametes is phasically younger than the other. The phasically less mature cell precedes the other down the pollen tube.

797 YASUI, K.
K. Fujii et alii : On the mechanism of nuclear division and chromosome arrangement. (A symposium). III. Studies on nuclear divisions *in vivo*. A. Behaviours of the nuclear elements in the meiotic prophase of PMCs and tapetum cells with special reference to the continuous phase of the nucleus.
Cytologia, Tokyo 1952 : **17** : 345–67.

Investigations were carried out on tapetal and pollen mother cells from the anthers of *Tradescantia, Allium, Canna* and other plants, using as media liquid paraffin saturated with tap water and different aqueous solutions of sucrose. The osmotic pressure of the continuous phase of the nucleus (CPN) or so-called nuclear sap increased with the successive stages of meiosis; possibly some of the structural changes of the chromosomes in meiotic prophase can be interpreted on the basis of the condition of the CPN. The CPN in both the pollen mother and tapetal cells had a higher water-absorbing capacity than the chromosomes in the nuclei

* General studies, see also individual crops.

of the same cells; the nucleolus had a lower water-absorbing capacity than either the CPN or chromosomes. It is suggested that the hyoplasm is derived from the CPN. The CPN, which may be composed mainly of a lipopeptide, is further considered to play a part not only in interactions at the nuclear surface but also the surface of other constituents of the protoplasm; it may even be involved in the determination of the relationship between cytoplasm and virus particle. The phenomenon of "Vitalmischungsartefakt" described by Bělař, or of synizesis, is explained on the basis of the high tension of the surface equilibrium of the CPN, and the absorption of water from the chromosomes and other cell constituents by the hygroscopic surface membrane of the CPN after disturbance of the equilibrium by a shock such as application of a microneedle. The phenomenon of the "Lichtleere," first studied by Fujii who termed it the "dark pocket in the cell," is also discussed.

798 Hayashi, T.
Surface-spread protein as a basis for cell structure and cell movement.
Amer. Nat. 1953 : **87** : 209–27.

It is suggested that cellular structures are formed by, and composed of, protein or possibly lipoprotein molecules, surface-spread at the interfaces of the heterophasic system within the cells. Chromosome movement during mitosis is interpreted in terms of this hypothesis. The experiments described in support of this suggestion deal with the biological activity of surface-spread protein fibres.

799 Bauch, R.
Selektive Speicherung von Trypaflavin durch die Nukleoproteide der Chromosomen. (**Selective storage of trypaflavin by the nucleoprotein of the chromosomes**).
Biol. Zbl. 1949 : **68** : 113–17.

Resting nuclei selectively absorb trypaflavin, an effect due, in *Chironomus* at least, to the parts of the chromosomes containing nucleoprotein. The inhibitory effect of trypaflavin on mitosis is attributed to a specific chemical reaction between this substance and nucleoprotein.

800 Sibatani, A.
Differential staining of nucleic acids III. Additional remarks.
Cytologia, Tokyo 1952 : **17** : 317–21.

Preferential reactivity with methyl green is regarded as being characteristic of nondisaggregated DNA only; disaggregated DNA and PNA of whatever molecular weight combine preferentially with pyronin (cf. *PBA*, Vol. XXIII, Abst. 854). Additional observations are reported on the metachromasia of thionin by nucleic acids *in vitro* and *in vivo*, and also on the electrostatic nature of the staining of cellular nucleic acids by this dye (cf. *PBA*, Vol. XXIII, Abst. 855).

801 Patau, K. & Swift, H.
The DNA-content (Feulgen) of nuclei during mitosis in a root tip of onion.
Chromosoma 1953 : **6** : 149–69.

The following interphase periods are distinguished: interphase I with, in diploid tissue, the deoxyribose nucleic acid content 2C; interphase II, the period of DNA synthesis; interphase III with the DNA content at 4C. Reasons for differentiating between interphase III and early prophase are given.
Measurements of DNA content by the new microphotometric two-wavelength method give results fully compatible with a working hypothesis of the strict constancy of the DNA content per chromatid and of its precise doubling during DNA synthesis. Certain contradictory results by other authors are examined and objections to them raised on methodological grounds.

802 Grundmann, E. & Marquardt, H.
Untersuchungen an Interphasekernen des Wurzelmeristems von *Vicia faba*. I. Mitteilung. Desoxyribosenukleinsäure-Gehalt und Grösse der Kerne. (**Investigations of the interphase nuclei of the root meristem of *V. faba*. I. Deoxyribose nucleic acid content and size of the nuclei**).
Chromosoma 1953 : **6** : 115–34.

The cells of the root meristem of *V. faba* were examined for deoxyribose nucleic acid content. At the end of anaphase, the daughter cells possess only half the amount of deoxyribose nucleic acid of the parent cell. By the beginning of the next metaphase an increase has taken place, the doubling of the content being spread over the whole of the interphase, and part of late telophase and early prophase.

803 Giordano, C.
La contrazione nucleare negli apici di giovani radici di *Phaseolus* trattate con percaina. (**Nuclear contraction in the apices of young *Phaseolus* roots treated with percaine**).
Nuovo G. bot. ital. 1950 : **57** : 683–84.

Concentrations of 0·3–0·05 p.p.m. of percaine caused a striking reduction in the nuclear diameter of the cells in the root tip.

804 HIRAOKA, T.
Observational and experimental studies of meiosis with special reference to the bouquet stage. XIII. Further experimental study of the nucleolar movement.
Cytologia, Tokyo 1952 : **17** : 287–91.

Movement of the nucleolus at the bouquet stage of meiosis in *Salvinia natans* (cf. Abst. 822) was reversibly inhibited by oxidation-inhibiting substances and narcotics, the lowest critical concentration for inhibition differing according to the reagent. Probably cytochrome oxidase is responsible for the oxidation involved in nucleolar movement.

805 YASAKI, Y. & SINOTÔ, Y.
Studies on nuclei and chromosomes by the fluoromicroscopy. I. Introductory remarks.
Cytologia, Tokyo 1952 : **18** : 336–44.

The application of the fluorochrome method of studying nuclei and chromosomes is described, aluminium-morine having been found to be the best reagent at present for the production of secondary luminosity. The nuclei and chromosomes of root tips of *Tradescantia paludosa* and *Vicia faba* became luminous and the morphology of the individual chromosomes could be analysed to some extent. Not all cells of *Saccharomyces cerevisiae* emitted light when treated with aluminium-morine. Buds attached to mother cells and the smaller free cells appeared to be homogeneously fluorescent; a luminous body was often seen in the nonluminous cells; with auramine treatment, granules were visible.

806 WILSON, G. B. & COLEMAN, P. G.
The ontogeny of chromosome and chromonema spirals. A re-evaluation.
Cytologia, Tokyo 1952 : **17** : 270–78.

Some of the literature on coiling is discussed, together with new data on coiling in somatic chromosomes of *Allium* and in meiotic chromosomes of *Tradescantia*. The two main theories of coiling are considered: (1) the torsion hypothesis, based on the induction of internal torsion through spiral orientation of the molecular structure, and (2) the compression hypothesis, according to which coiling may be a direct consequence of a differential change in length between the matrix and chromonema. The conclusion is reached that the properties of readily visible helical and chromatid relational coils can be best interpreted according to the compression concept, whereas such coils as secondary spirals and chromosome intertwining probably involve some degree of internally produced torsion; it is suggested that chromonema contraction is the result of spatial rearrangement at the molecular level, and that such rearrangement under certain specific conditions may give rise to, or facilitate, the latter types of coiling.

807 YUASA, A.
The effect of K-ions on the structure of the chromosome.
Cytologia, Tokyo 1952 : **17** : 329–35.

As the result of the action of K ions, the matrices of the chromosomes of pollen mother cells of *Tradescantia* became swollen or were destroyed, and the chromonemata became visible, and in some cases uncoiled. For obtaining clearly observable chromonemata, treatment for two minutes with 0·1% solution of KOH or 1·0% solution of KCNS, prior to fixing and staining with iron acetocarmine, is considered the most satisfactory.

808 JACOBSON, B.
Hydration structure of deoxyribonucleic acid and its physico-chemical properties.
Nature, Lond. 1953 : **172** : 666–67.

It is shown that the twin helical structure proposed for deoxyribonucleic acid by Watson and Crick (cf. Abst. 57) would fit easily into the helical interstices believed to occur in the tetrahedral molecular lattice of water. The physical properties of the aqueous solution lend support to this hypothesis. Further, should the hypothesis be correct, the mutual relations of the hydrogen bonds in the nucleic acid and the water lattice would enable the two polynucleotide chains to separate with only a small expenditure of energy.

809 WILKINS, M. H. F., SEEDS, W. E., STOKES, A. R. & WILSON, H. R.
Helical structure of crystalline deoxypentose nucleic acid.
Nature, Lond. 1953 : **172** : 759–62.

X-ray diffraction photographs of crystalline deoxypentose nucleic acid lend support to Watson and Crick's theory of a twin helical structure (cf. Abst. 57); there appear to be 11 nucleotides per turn of one helix and also some slight distortion. Molecular models of the suggested structure have been made, and, with the possible exception of some rather low interatomic distances, lend support to the interpretation advanced.

810 DELAY, C.
Nombres chromosomiques chez les phanérogames. (Chromosome numbers in the phanerogams).
Rev. Cytol., Paris 1950–51 : **12** : 1–368.
A comprehensive catalogue of the chromosome numbers of the angiosperm families is given, together with the sources of information.

811 LIMA-DE-FARIA, A.
The regions of special cycle of division of *Agapanthus* chromosomes.
Chromosoma 1953 : **6** : 33–44.
In both meiotic divisions in *A. umbellatus*, the centromere was found to be divided as early as prometaphase. The proximal region of the arms, and not the centromere, appeared to be directly responsible for holding together the two sister chromatids of each chromosome until the beginning of anaphase II. The significance of this role of the arms is discussed in relation to the nondisjunction associated with B chromosomes and to the behaviour of t-ends.

812 LEPEŠINSKAJA, O. B. & KRJUKOV, V. G.
(Some errors in the interpretation of the theory of the evolution of living substance).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1953 : No. 3 : Ser. Biol. : 16–24. [Russian].
A paper by Navašin, Gerasimova-Navašina and Jakovlev (cf. *PBA*, Vol. XXIII, Abst. 862), and another, by Lodkina, dealing with the phasic development of wheat and of the water lily, are criticized for their Virchowian content and some methodological errors.

813 KONONKOV, P. F.
(The question of rejuvenation of sexually reproducing plants).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1953 : No. 3 : Ser. Biol. : 25–29. [Russian].
The formation of cells and ontogenesis of nuclei in the inflorescence primordia of *Allium cepa* were studied. The observations confirmed some of the findings by Ellengorn *et al.* concerning the origin of new cells by processes differing from normal mitosis (cf. *PBA*, Vol. XXII, Absts. 1618 and 1619).

814 BEATTY, J. W. & BEATTY, A. V.
Duration of the stages in microspore development and in the first microspore division of *Tradescantia paludosa*.
Amer. J. Bot. 1953 : **40** : 593–96.
Five morphological stages from the end of the tetrad stage following meiosis to the first division of the microspore were identified in material maintained at 30° C ± 0·5; each of such stages required about 24 hours. The first microspore division took approximately 36 hours for completion, 24 of which were spent in very early prophase, 4·43 in early prophase, 3·23 in midprophase, 2·75 in late prophase, 0·36 in prometaphase, 0·50 in metaphase, 0·50 in anaphase and 0·23 in telophase.

815 BISHOP, C. J. & MCGOWAN, L. J.
The role of the vegetative nucleus in pollen tube growth and in the division of the generative nucleus in *Tradescantia paludosa*.
Amer. J. Bot. 1953 : **40** : 658–59.
Diploid uninucleate pollen grains induced by colchicine treatment exhibited completely normal growth prior to nuclear division compared with normal haploid binucleate grains. In the uninucleate pollen tubes, however, the nucleus failed to divide. It was concluded that the vegetative nucleus performs an essential function in the division of the generative nucleus.

816 PERSON, C.
Observations on interphase and prophase nuclei of root tips of Einkorn wheat and onion.
Canad. J. Bot. 1953 : **31** : 527–30.
Evidence has been obtained from mitotic cells of *Allium cepa* and *Triticum monococcum* that during interphase and prophase the arrangement of the chromosomes bears a definite relation to the nuclear axis. The establishment of the metaphase plate by the centromeres is described. The problem of nuclear polarity is discussed; it is suggested that investigation of the differences between the reticulate and euchromocentric types of nuclei should prove valuable, using physiologically active substances known to affect polarity.

817 WADA, B.
The effect of chemicals on mitosis studied in *Tradescantia* cells *in vivo*. II. Hydrazino-tropone compounds.
Cytologia, Tokyo 1952 : **17** : 279–86.
Investigations were carried out on the effects of two compounds, 2-hydrazino-tropone and 7-bromo-2-hydrazino-tropone, on staminal hair cells in *Tradescantia*. Within a certain range of concentrations, swelling of the chromosomes and cytoplasm occurred, without an inhibitory effect on mitosis. Chromosome stickiness sometimes led to the apparent formation of bridges at telophase. Most of the cells became

binucleate as the result of the disorganization of the phragmoplast at telophase; the compounds did not act upon the atractoplasm.

818 DEYSSON, G.
Recherches sur la perméabilité des cellules végétales. (Research into the permeability of plant cells).
Rev. Cytol., Paris 1952 : **13** : 153–315.

Chloroform, ether and benzene render the meristematic cells more sensitive to the mitoclastic action of colchicine and antipyrine. Sodium ricinoleate has a similar effect on the mitoclastic action of colchicine, antipyrine and caffeine.

819 ARONOFF, S. & GRAF, G. E.
Carbon dioxide fixation and mitotic poisons.
Nature, Lond. 1953 : **172** : 1043–44.

Experiments on roots of soya bean and onion showed that bromobenzene and other halogenated aromatic compounds have an inhibitory effect upon respiration. Substances such as colchicine and acenaphthene, however, do not affect respiration at the very low concentrations at which they influence mitosis. The halogenated aromatics or any other substances inhibiting a normal glycolytic pathway may thereby affect mitosis indirectly, but they cannot validly be termed mitotic poisons.

820 DUNCAN, R. E. & WOODS, P. S.
Some cytological aspects of antagonism in synthesis of nucleic acid.
Chromosoma 1953 : **6** : 45–60.

Investigations were carried out on the cytological effects of benzimidazole and 5-aminouracil upon root-tip cells of *Allium cepa*. Solutions of both substances reduced the frequency of mitosis, but did not affect the spindle mechanism. After treatment with 5-aminouracil, small interstitial portions of the chromosomes were Feulgen-negative at anaphase. After treatment with benzimidazole, the chromosomes were more contracted at metaphase and anaphase. Adenine sulphate caused a temporary reversal of the reduction in frequency of mitosis by benzimidazole. Half of the inhibition of root growth caused by 5-aminouracil (50 p.p.m.) was reversed by thymine (50 p.p.m.) during the test period of 24 hours. When folic acid (5 p.p.m.) was added to this mixture, root growth exceeded that of the controls. The chromosomes, however, exhibited Feulgen-negative gaps.

In untreated root tips, two classes of interphase nuclei occurred in approximately equal frequencies, one (4C) showing twice the amount of Feulgen stain as the other (2C). Both 5-aminouracil and benzimidazole inhibited doubling of the DNA content in interphase nuclei, as shown by the Feulgen reaction. The latter substance apparently also blocked prophase.

821 HIRAOKA, T.
Observational and experimental studies of meiosis with special reference to the bouquet stage. XI. Locomotory movement of the nucleolus in the bouquet stage.
Cytologia, Tokyo 1952 : **17** : 201–09.

Locomotion of the nucleolus within the nuclear cavity has been observed at the bouquet stage in pollen mother cells of *Salvinia natans* and *Acacia baileyana*, and has been plotted in diagrams. This movement is considered to be due to the active streaming of the caryolymph. It is suggested that in general such streaming may play an important part in the formation of the bouquet and in syndesis.

822 HIRAOKA, T.
Observational and experimental studies of meiosis with special reference to the bouquet stage. XIV. Some considerations on a probable mechanism of the bouquet formation.
Cytologia, Tokyo 1952 : **17** : 292–99.

Discussing the results of his previous investigations (cf. *PBA*, Vol. XXI, Abst. 79; Vol. XXIII, Absts. 874 and 875; and Vol. XXIV, Absts. 804 and 821), the author concludes that streaming of the caryolymph plays an important part in the production of the bouquet figure.

823 CLEVELAND, L. R.
Studies on chromosomes and nuclear division. I. Fusion of nucleoli independent of chromosomal homology. II. Spontaneous aberrations, homologous and non-homologous union of fragments. III. Pairing, segregation, and crossing-over. IV. Photomicrographs of living cells during meiotic divisions.
Trans. Amer. phil. Soc. 1953 : **43** : 809–48.

All four papers show that certain flagellates of the order Hypermastigina provide valuable material for general cytological studies. Part I describes the nucleolar fusion which occurred, irrespective of chromosome homology, during mitotic prophase of the haploid two-chromosome species *Holomastigotoides tusitala*. Part II deals with spontaneous chromatid breakage and reunion in the same organism. The observed

breaks probably occurred in early prophase, shortly after chromosomal duplication, and their cause may be intimately connected with the duplication phase. Breakage was not confined to any particular region of the chromatid, and the free ends of nonhomologous chromatids united just as often as those of homologous ones.

Part III discusses mitotic pairing in *H. diversa* and meiotic pairing in *Barbulanympha*. *H. diversa* consists of two races, a haploid ($n = 2$) and diploid ($2n = 4$), both of which are further subdivided into forms with single or double chromatids. In *Barbulanympha*, single chromatids are always produced. From an analysis of the various types of chromatid pairing possible, it is postulated that complete segregations of chromatids and crossing-over depend directly upon type of chromatid pairing. In mitosis, sister chromatid pairing results in complete segregation, but chromosome pairing, i.e. pairing of both sister and nonsister chromatids, frequently leads to crossing-over, as a means of relieving the tension generated by pairing of sister chromatids in one region and of nonsisters in another. The function of chromosome pairing in mitosis is therefore regarded as prevention of segregation. In meiosis I, as exemplified by *Barbulanympha*, complete segregation is in any case impossible since sister chromatids have a common centromere; thus chromosome pairing serves only as an additional restriction of segregation. The difference between mitosis and meiosis I with respect to the function of pairing is attributed to the inhibition of centromere duplication in meiosis I. In part IV, photomicrographs are given of living cells of *Barbulanympha* undergoing meiosis; comments are made on the usage of some cytological terms such as a chromatic figure and spindle.

824 HAGA, T. & KURABAYASHI, M.
Genom and polyploidy in the genus *Trillium*. IV. Genom analysis by means of differential reaction of chromosome segments to low temperature.
Cytologia, Tokyo 1953 : **18** : 13–28.

Exposure of plants of *Trillium* species to a temperature of $0 \pm 0{\cdot}2°$ C, when they had begun to flower, resulted in the differentiation of specific segments of the chromosomes, observed in stained preparations of the ovules. The differentiation was a progressive phenomenon but was also reversible; treatment for 72 hours was suitable for ensuring the final degree of differentiation. Since the final differentiation was specific and constant for a given chromosome and for each set of chromosomes, genome analysis was possible.

825 SHARMA, A. K. & BHATTACHARJEE, D.
Somatic reduction in untreated leguminous plants.
Genetica 1953 : **26** : 410–14.

Somatic reduction has been observed in untreated plants of *Vicia*, *Lathyrus* and *Lens* at the Cytogenetics Laboratory, Botany Department, Calcutta University. Numerical segregation of the chromosomes was usually regular but some irregularities occurred. Treatment with ·0025 M 8-oxyquinoline had an accelerating effect upon somatic reductional division but did not cause additional irregularities in chromosomal segregation.

826 HAGA, T.
Meiosis in *Paris*. II. Spontaneous breakage and fusion of chromosomes.
Cytologia, Tokyo 1953 : **18** : 50–66.

On the basis of evidence from meiosis in *P. verticillata* and *Trillium hagae*, the view is expressed that many of the meiotic configurations attributed by previous investigators of various plants to crossing over in inverted segments are in fact the result of spontaneous breakage and fusion. This view is based on observations of (1) free chromatid or chromosome fragments, without bridges, (2) types of fragments explicable only as the result of the fusion of two originally separate fragments, (3) a configuration apparently the result of the breakage and fusion of chromatids belonging to nonhomologous chromosomes, (4) a univalent bridge and (5) the considerable variation in fragment size, even in different configurations involving the same chromosome arm. The relative frequency of bridges and loops at anaphase I was, moreover, that expected on the basis of the breakage-fusion hypothesis. Approximately half of the anaphase configurations must have resulted from breaks in the centromeric region. Since chromatid as well as chromosome breaks occurred, the time of breakage is assumed to be mainly late pachytene and diplotene.

827 IHM, P.
Bemerkungen zur Planung und statistischen Auswertung zytologischer Versuche.
(**Observations on the planning and statistical evaluation of cytological experiments**).
Z. indukt. Abstamm.- u. VererbLehre 1953 : **85** : 297–306.

A general statistical investigation is made into the problem of interpreting frequency data on

cytological aberrations, derived from observations on comparatively small numbers of cells, yet involving a number of plants. The author finds the Poisson distribution inappropriate for representing the frequency distribution of the number of aberrations per cell and proposes an alternative distribution involving gamma functions. Since the frequency distribution of aberrations per cell is not normal, corrections are supplied for applying the *t* test for significance of means and differences between means.

828 Schmermund, H. J., Bleek, H. & Heinrich, H. L.
Chromosomenveränderungen bei Gerstenkeimlingen durch schnelle Elektronen eines 6 MeV-Betatrons. (**Chromosome changes in barley seedlings produced by fast electrons from a 6 MeV betatron**).
Strahlentherapie 1950 : **81** : 177–86.

The effects of equivalent doses of X rays and 4 MeV electrons on mitosis in root tips of Heines Haisa spring barley were compared. In both cases, the number of induced chromosomal aberrations rose with increasing dose. The fast electrons, however, were less effective in inducing aberrations than corresponding doses of X rays. It is concluded from these results that 3–5 hits are required for each induced aberration.

829 Swanson, C. P., Rupert, C. S. & Yost H. T. (Jun.)
Infrared absorption and temperature studies on the buds and chromosomes of *Tradescantia paludosa*.
Amer. J. Bot. 1953 : **40** : 557–65.

Evidence was obtained that the effective range of infrared wave lengths, necessary to alter the rate of chromosome breakage induced by subsequent X irradiation, was centred upon the 0·95–0·97 region of the spectrum. It could not however be determined whether this effective segment was in fact confined to a narrow band of wave lengths at 0·95–0·97, or whether it represented the peak of a more general absorption curve. Results having bearing on the possibility that the infrared radiation is trapped by the water of a hydrated chromosome are discussed. Data on transmission of radiation by sepals, petals, anther walls and intact anthers provided no indication of specific absorption bands, which might be related to the supposedly effective region of 0·95–0·97. A comparison of solar infrared radiation with that from an artificial source revealed no qualitative or quantitative differences. No consistent effect of sensitization was obtained if the temperature at which exposure to infrared occurred was 20° C or higher.

830 Sugimoto, T.
(**On sterility in *Cassia Tora* induced by the atomic bomb. I. Morphological observations on an asynaptic plant**).
Kyushu Daigaku Nogakubu Gakugei Zasshi/Sci. Bull. Fac. Agric. Kyushu Univ. 1951 : **13** : 14–19. [Japanese].

A description is given of an asynaptic plant collected at Nagasaki after the atomic explosion of 1945. It differs from the normal type in being more copiously branched and in having fewer seeds per pod.

831 D'Amato, F.
Sulla presenza di sostanze ad azione antimitotica nel seme di *Pisum sativum* L. (**On the presence of substances with antimitotic action in the seed of *P. sativum* L.**).
Caryologia 1952–53 : **5** : 217–22.

The effects of aqueous extracts of pea seeds of two varieties upon mitosis and chromosome behaviour in *P. sativum* and *Allium cepa* were studied.

Peas appear to contain two substances inhibiting mitosis, one in the seed coat, and the other probably in the cotyledons. The former substance is destroyed, or perhaps inactivated, in old seeds; aqueous extracts from such seeds did not induce chromosome breaks. Evidence of synergic action by the two substances was found.

832 Müntzing, A.
Polyploidernas ekologi. (**The ecology of polyploids**).
K. LantbrAkad. Tidskr. 1953 : **92** : No. 2–3 : 119–30.

The incidence of primary and secondary polyploids and their importance in the evolution of various groups are discussed, and data relating to the physiology and ecology of autopolyploids are reviewed. As compared with their corresponding diploids, polyploids generally react differently to their environment, and a study of the optimum type of environment is therefore necessary in deciding where a newly bred autopolyploid crop plant can be grown to best advantage.

833 Gustafson, F. G.
A comparison of thiamine, niacin, and riboflavin content in diploid and tetraploid plants.
J. Hered. 1953 : **44** : 149–54.

The riboflavin, thiamin and niacin content of tetraploid plants was compared with that of

the corresponding diploids. In *Vinca rosea*, *Lycopersicon pimpinellifolium* and *Tradescantia ohiensis* the riboflavin was significantly higher in the diploids. Niacin was also higher in the diploids of *L. pimpinellifolium* than in the tetraploids.

These experiments do not support the view that polyploidy may be a means of increasing the vitamin content of a plant, and in the view of the author hybridization offers greater possibilities.

834 Carpentier, S. & Pacault, A.
Action mitoclasique de quelques carbures cycliques. Relation entre cette action et l'aromaticité des carbures. (**Mitoclastic action of some cyclic hydrocarbons. Relation between this action and the aromaticity of the hydrocarbons**).
Rev. Cytol., Paris 1949 : **11** : 306–13.

A comparative study has been made of the mitoclastic activity of benzene, cyclohexene, cyclohexane, pyridine, piperidine, pyrazine, piperazine, pyrrol, pyrrolidine, dihydropyrane, tetrahydropyrane, furane, α and β dihydrofurane, tetrahydrofurane, thioxane, dioxane and morpholine. In general, saturated compounds, with the exception of cyclohexane, were mitoclastically inactive. The unsaturated compounds were generally active, but the pseudosaturated aromatic types, in which the mobile electrons were more delocalized, were active in lower concentrations.

835 Knapp, R.
Über Zusammenhänge zwischen Polyploidie, Verbreitung, systematischer und soziologischer Stellung von Pflanzenarten in Mitteleuropa. (**On the relationship between polyploidy, distribution and systematic and sociological position of plant species in Central Europe**).
Z. indukt. Abstamm.- u. VererbLehre 1953 : **85** : 163–79.

Data are given which substantiate the hypothesis (cf. *PBA*, Vol. XXIII, Abst. 849) that high altitudes and cool climates lead to an increase in polyploidy. This increase is partly due to the increasing proportion of hemicryptophytes, to which polyploidy is of value in natural selection.

836 Modilevskiĭ, Ja. S.
(**The problem of fertilization in flowering plants**).
Priroda (Nature) 1953 : No. 10 : 33–41. [Russian].

Fertilization is regarded as a series of biological processes, beginning with pollination and ending with pericarp development. It is thought that the endosperm is involved in some way in the metabolic interactions between the embryo, ovule, ovary and mother plant, and therefore affects the formation of the fruit and seed. This is supported by an embryological analysis of a Far Eastern onion, from whose flowers the stamens and styles had been removed to prevent fertilization. It was found that embryos were produced in the ovules of unfertilized ovaries and were capable of normal development until the ovaries aborted. These ovules contained no endosperm and to this is attributed the abortion of the ovules and ovary.

837 Galán, F.
Analyse génétique de la monœcie et de la dioecie zygotiques et de leur différence dans *Ecballium elaterium*. (**Genetical analysis of zygotic monecy and diecy and their difference in *E. elaterium***).
Acta salmant. Cienc. 1951 : No. 1 : Pp. 15.

By intercrossing Spanish monecious and diecious strains of *E. elaterium*, the following scheme of genetical determination for sexual type was derived: male, $a^d a^D$ and $a^+ a^D$; monecious, $a^+ a^+$; and female, $a^+ a^d$ and $a^d a^d$. The wild diecious strains are $a^d a^D$ and $a^d a^d$.

838 Conger, A. D. & Fairchild, L. M.
A quick-freeze method for making smear slides permanent.
Stain Tech. 1953 : **28** : 281–83.

The simple process of freezing the slide on a block of dry ice, placing it immediately in 95% or absolute alcohol and then mounting it has been found to be a satisfactory substitute for the usual technique of dehydration.

839 Hyde, B. B. & Gardella, C. A.
A mordanting fixation for intense staining of small chromosomes.
Stain Tech. 1953 : **28** : 305–08.

Substitution of pure propionic acid for acetic acid in the iron-mordant fixative has been found to be useful in preparing carmine-stained squashes of root tips of plants with small chromosomes. The fixative consists of a 3 : 1 mixture of 95% alcohol and a solution of Fe $(OH)_3$ in pure propionic acid.

840 Conger, A. D.
Culture of pollen tubes for chromosomal analysis at the pollen tube division.
Stain Tech. 1953 : **28** : 289–93.

Methods of collecting and handling the dry pollen, slide preparation, sowing, growing the pollen, fixation and staining are described, with particular reference to *Tradescantia*. The methods are also applicable to other genera. Information is provided on temperature, moisture,

gas, pressure and radiation treatments which have been tolerated by dry pollen grains and by growing pollen tubes.

841 Traub, H. P.
Arabinic acid, a new non-precipitating ingredient in combined staining and mounting media.
Euclides, Madr. 1953 : **13** : 103–14.

Traub, H. P.
Pure arabinates as the chief non-volatile ingredients in combined staining and mounting media.
Ibid. 1953 : **13** : 289–98.

Information is included on the preparation and use of combined staining and mounting media containing arabinates, or arabinic acid plus arabinates. Preparations of root tips of *Allium cepa*, *Amaryllis* and *Hemerocallis*, and of pollen grains from several species, demonstrated the value of the media.

842 Schwemmle, J.
Selektive Befruchtung bei der *Oenothera Berteriana*. (**Selective fertilization in *Oe. Berteriana***).
Biol. Zbl. 1953 : **72** : 129–46.

Schwemmle, J.
Selektive Befruchtung bei der *Oenothera cdorata*. (**Selective fertilization in *Oe. odorata***).
Ibid. 1953 : **72** : 405–24.

Schwemmle, J. & Koepchen, W.
Weitere Untersuchungen zur selektiven Befruchtung. (**Further investigations of selective fertilization**).
Z. indukt. Abstamm.- u. VererbLehre 1953 : **85** : 307–46.

When the complex heterozygote *Oe. berteriana* (B.l.) is selfed, fertilization of the B ovules is effected solely by l pollen tubes, and fertilization of the l ovules solely by B pollen tubes. The combination B.l. occurs more frequently than the combination l.B., and consequently the affinity between the B ovules and the l pollen tubes must be greater than that between the l ovules and the B pollen tubes.
When *Oe. odorata* (v.I.) was self-fertilized the faster-growing v pollen tubes were more attracted to the I ovules than to the v ovules, and the I pollen tubes more to the v ovules than to the I ovules. The homozygotes v.v. and I.I. were extremely rare.
Crosses involving *Oe. odorata* containing *odorata* plasma and *Oe. odorata* containing *berteriana* plasma showed that the growth of the pollen tubes in the style is influenced by the plasma, and that the affinity of the v ovaries for the I tubes is greatest when both parents possess the same plasma. When v ovules contained *odorata* plasma, they had a greater attraction for B, l, v, ha and hsc pollen tubes than did v ovules with *berteriana* plasma, whilst I ovules with *berteriana* plasma had a greater attraction for B, l, v, ha and W pollen tubes than did I ovules with *odorata* plasma. In selfings of *Oe. odorata* with *berteriana* plasma, the v tubes have less advantage over the I tubes than in selfings of *Oe. odorata* with *odorata* plasma, and consequently more I.I. homozygotes are formed.

843 Mameli Calvino, E.
Le sostanze di riserva dei pollini e il loro significato, filogenetico, ecologico, embriologico. (**The reserve substances of pollen and their phylogenetic, ecological and embryological significance**).
Nuovo G. bot. ital. 1952 : **59** : 1–26.

In general, anemophilous plants have starchy pollen in contrast to entomophilous plants where the pollen is fatty. Carotenoids have only been found in entomophilous plants. Starchy pollen is believed to be a primitive characteristic. There is an association between starchy pollen and aporogamy, and between fatty pollen and porogamy.

844 Haccius, B. & Reinholz, E.
Somatisch induzierte Veränderung der Keimblattzahl bei *Eranthis hiemalis* durch Röntgenstrahlen. (**Somatic changes in the cotyledon number of *E. hiemalis* induced by X irradiation**).
Naturwissenschaften 1953 : **40** : p. 533.

Seeds of *E. hiemalis* were X-irradiated and embryos with three and four cotyledons obtained. The change may be due either to damage caused to certain cells of the embryo or to a disturbance of the hormone balance. It is suggested that *E. hiemalis* is a suitable object for experiments in inducing changes in cotyledon number.

DISEASES, INJURIES, BACTERIA, FUNGI, VIRUSES

845 Hofsten, C. G. von
Skillnaden mellan immun och resistent. (**The difference between immune and resistant**).
Lantmannen, Stockholm 1953 : **37** : p. 1115.

Lihnell, D.
Immun och resistent—några synpunkter. (**Immune and resistant—some views**).
Ibid. 1953 : **37** : p. 1165.

The exact meaning and proper use of the

above two words are discussed, with examples of their misuse in the terminology of diseases of the potato.

846 Okabe, N.
(Studies on *Bacterium solanacearum*, with special reference to the pathogenicity of colony variants).
Shizuoka Norin Gakko Kenkyu Hokoku/Bull. Shizuoka Agric. Coll. 1949 : 41–59. [Japanese].

A report is given of the types of variation observed in a series of isolates of *B. solanacearum*. It is noted that there appear to be two forms of the F type: a stable form and an unstable form which changes readily into the Op type. Variation may depend, to some extent, on the presence of substances in the culture medium and on infection by bacteriophage.

847 Manten, A. & Rowley, D.
Genetic analysis of valine inhibition in the K 12 strain of *Bacterium coli*.
J. gen. Microbiol. 1953 : **9** : 226–33.

Full resistance to valine in strain K 12 developed by a one-step mutational process. Analysis of recombinants revealed that valine resistance was controlled by one gene which was closely linked with the gene for leucine synthesis. It is suggested that the highly specific reversal of valine inhibition may be a direct result of the close proximity of these two genes. The need for a new approach to linkage data in *B. coli*, in view of recent work showing the occurrence of two mating types, is stressed (cf. *PBA*, Vol. XXIII, Abst. 1713 and 1714).

848 Wright, B. E.
Auto-adaptation : a new phenomenon observed in a bacterial population.
J. Bact. 1953 : **66** : 407–20.

The behaviour of partially reverted strains of a glycineless mutant of *Escherichia coli* was analysed. When cultured in a minimal medium, the cells grew at increasing rates until the need for serine and glycine no longer limited their growth. This phenomenon has been termed "auto-adaptation" and resembles an enzymatic adaptation in that a large proportion of the population presumably acquires an increased biosynthetic ability in a relatively short time.

849 Šainskaja, I. M.
(Selection and tests of active strains of acetic acid bacteria for making vinegar from alcohol).
Mikrobiologija (Microbiology), Moskva 1953 : **22** : No. 1 : 72–78. [Russian].

In Moscow, many strains of acetic acid bacteria, suitable for the manufacture of good quality vinegars, have been selected from material originating in Russian and Ukrainian vinegar factories. *Bacterium curvum* strain 31, which successfully passed industrial tests at Moscow and Gusj-Hrustaljnyĭ, is described.

850 Okabe, N. & Goto, M.
(Studies on lines of *Bacterium solanacearum* with special reference to the different sorts and their classification).
Shizuoka Daigaku Nogakubu Kenkyu Hokoku/Rep. Fac. Agric. Shizuoka Univ. 1952 : No. 2 : 64–93. [Japanese].

An extensive collection of samples of *B. solanacearum* from various hosts in Japan could be classified into 9 strains on the basis of enzyme activity, habit of growth and pigmentation. These strains could be further split into 17 by their reaction to a set of 10 phages. The host range of each strain is indicated.

851 Okabe, N. & Goto, M.
(Studies on *Bacterium solanacearum* with special reference to the pathogenicity of the strains).
Shizuoka Daigaku Nogakubu Kenkyu Hokoku/Rep. Fac. Agric. Shizuoka Univ. 1952 : No. 2 : 94–114. [Japanese].

Further details are given on the host range of the 17 strains described in an earlier paper (cf. Abst. 850).

852 Bergersen, F. J.
Cytological changes induced in *Bacterium coli* by chloramphenicol.
J. gen. Microbiol. 1953 : **9** : 353–56.

Treatment with chloramphenicol resulted in nuclear changes, followed by morphological abnormalities. Extra granules were observed in cells whose nuclear material had an abnormal appearance; polar growing-points then became prominent, giving rise to cell proliferations, pointed filaments or branched forms being produced. These changes occurred only within critical limits of concentration of the antibiotic, the limits varying according to the strain used.

853 Groman, N. B.
Evidence for the induced nature of the change from nontoxigenicity to toxigenicity in *Corynebacterium diphtheriae* as a result of exposure to specific bacteriophage.
J. Bact. 1953 : **66** : 181–91.

A relatively high proportion of *C. diphtheriae* changed from nontoxigenicity to toxigenicity when exposed to phage. The change appeared to be induced, and not the result of selection.

854 Wielocka, H.
Siła wiązania wolnego azotu przez różne szczepy azotobaktera. (**The power of assimilation of free nitrogen by various strains of *Azotobacter*).**
Roczn. Nauk rol. 1952 : Ser. A : **66** : No. 1 : 186–87.

In order to select *Azotobacter* strains with a high nitrogen fixation capacity, 25 strains, isolated from different soils, were studied as regards their morphological characteristics and their assimilative power in nitrogen fixation. Results showed that the strains isolated from fertile soils, e.g. black earths and loess, were the most active in assimilating free nitrogen and the most effective in improving plant yields.

855 Clark, J. B., Galyen, L. I. & Webb, R. B.
The effect of organic solvents on the appearance of bacterial nuclei.
Stain Tech. 1953 : **28** : 313–17.

Treatment of bacterial smears with organic solvents produced typical abnormal nuclei which could lead to false interpretation of nuclear events. Acid hydrolysis also affected the appearance of the nuclei. Caution in interpreting nuclear structure and activity in bacteria is therefore advocated, since with such small cells ordinary staining procedures may easily give rise to artefacts. The crystal violet stain, whose use does not involve either organic solvents or acid hydrolysis, is regarded as the most suitable for studying the bacterial nucleus.

856 Bisset, K. A.
The cytology of *Caryophanon latum*.
Mycologia 1953 : **45** : 790–93.

A criticism is made of the claims of DeLamater that mitosis can be demonstrated in the bacterium *C. latum*. The mitotic figures described by DeLamater are believed to be somewhat shrunken bacterial nucleoids distributed over 2–3 or more of the discoid cells composing the complete organism.

857 Katagiri, M. & Sato, R.
Accumulation of phenylalanine by a phenylalanineless mutant of *Escherichia coli*.
Science 1953 : **118** : 250–51.

A mutant requiring phenylalanine for growth accumulated a considerable amount of this substance, when cultivated on Davis's minimal medium supplemented with a limited amount of the aminoacid. This observation is apparently contrary to the general theory that a mutant requiring a substance for growth is genetically blocked for a certain reaction. The results of shaking and autoclaving experiments have suggested the following explanation of the apparent anomaly. The accumulation of a highly unstable compound X first takes place on the minimal medium; with prolonged incubation, this compound is gradually converted to another compound, Y, the precursor of phenylalanine; the phenylalanine produced may then be excreted into the medium for reasons not yet known.

858 Davis, B. D.
Autocatalytic growth of a mutant due to accumulation of an unstable phenylalanine precursor.
Science 1953 : **118** : 251–52.

A phenylalanine-auxotrophic mutant of *Escherichia coli* accumulated a growth factor consisting, at least partly, of phenylalanine. This accumulation of phenylalanine became understandable when it was found that it was preceded by the accumulation of an unstable substance, provisionally called prephenylalanine (cf. Abst. 857). The usual medium, with an initial pH of 7·0, became sufficiently acid during incubation to account for the conversion of prephenylalanine into an active factor, which in turn could be converted by the cells into phenylalanine.

859 Lederberg, J. & Tatum, E. L.
Sex in bacteria: genetic studies, 1945-1952.
Science 1953 : **118** : 169–75.

A comprehensive survey is given of research on the genetics of *Escherichia coli* by the authors and other investigators. Of the most recent work discussed, the discovery of a compatibility system is of particular interest (cf. *PBA*, Vol. XXIII, Absts. 912 and 1713).

860 Lecocq, E.
Apparition de la résistance à l'hydrazide de l'acide isonicotinique parmi les Mycobactéries soumises à son action. (**The appearance of resistance to the hydrazide of isonicotinic acid in mycobacteria exposed to its action**).
CR Soc. Biol., Paris 1952 : **146** : 1447–49.

M. tuberculosis is normally inhibited by the above substance, but resistant strains appeared in cultures grown in its presence. The mechanism whereby resistance developed is uncertain, but concentrations of the chemical below the inhibiting value suffice to induce resistance.

861 Loĭcjanskaja, M. S.
(A new species of acetic acid bacteria).
Mikrobiologija (Microbiology), Moskva 1953 : **22** : 263–66. [Russian].

A description is given of a new species designated

Acetobacter acetovorum, selected from material obtained in a vinegar factory. It is regarded as a possible mutant of *A. xylinum*. However, it is suppressed by the latter when grown in mixed culture.

862 Welsch, M.
Lyse "collatérale" des staphylocoques normaux en présence de staphylocoques lysogènes induits par irradiation ultraviolette. (**"Collateral" lysis in normal staphylococci in the presence of lysogenous staphylococci rendered lysogenous by ultraviolet irradiation**).
CR Soc. Biol., Paris 1953 : **147** : 537–40.
Mutant strains of *Micrococcus pyogenes* var. *aureus*, when grown in mixed colonies with the lysis-resistant parent strain, provoked lysis in the latter. The nonmutant strain did not, however, release as many phages per lysis as the mutant staphylococcus.

863 Welsch, M.
Induction par irradiation ultraviolette d'un staphylocoque polylysogène. (**Induction by ultraviolet irradiation of a polylysogenic staphylococcus**).
CR Soc. Biol., Paris 1953 : **147** : p. 931.
Two distinct types of probacteriophage are liberated by colonies of the lysogenic strain *Micrococcus pyogenes* var. *aureus* 129. The corresponding phages in the indicator strain 126 give rise to two kinds of plaque, one large and one small. Mutants arising in strain 126 allow the breeding of pure strains of each phage. Lysogenic cultures of the bacterium contain approximately ten times as many phages of the small plaque type as of the large plaque kind. Any colony of *M. pyogenes* var. *aureus* 129 will give rise to both types of phage, but it could not be determined whether individual bacteria released both types.

864 Visconti, N.
Resistance to lysis from without in bacteria infected with T2 bacteriophage.
J. Bact. 1953 : **66** : 247–53.
When bacteria are first infected with T2 phage at low multiplicity, they become resistant to lysis from outside when later superinfected at high multiplicity. By using strains of T2 with different genetic markers for the first infection, it was found that the superinfecting phage can participate in growth within these bacteria which have become resistant to lysis from outside. The frequency of genetically mixed bursts, which is a measure of the growth of the second phage, is related directly to the multiplicity of superinfecting phage and inversely to the interval of time between the two infections.

865 Olive, L. S.
The structure and behaviour of fungus nuclei.
Bot. Rev. 1953 : **19** : 439–586.
A survey is presented of the literature published during the past 25 years on the nuclear cytology of the Myxomycetes and related organisms, Phycomycetes, Ascomycetes and Basidiomycetes.

866 Raper, J. R.
Tetrapolar sexuality.
Quart. Rev. Biol. 1953 : **28** : 233–59.
A survey is given of the phenomenon of tetrapolar sexuality in the Basidiomycetes, the following topics being considered; life cycle and sexuality; the basic pattern of tetrapolarity; multiple allelomorphic series governing compatibility reactions; "mutation" of incompatibility factors; the pattern of intertype reactions; different modes of dicaryotization; heterocaryons; and heterocaryotic mutagenesis (cf. *PBA*, Vol. XXIII, Abst. 965).

867 French, A. M.
Physiologic differences between two physiologic races of *Phytophthora infestans*.
Phytopathology 1953 : **43** : 513–16.
Difference in the responses of the common field race A and of race B of *Ph. infestans* to aminoacids and other nutritive substances are reported.

868 Rizet, G. & Engelmann, C.
Contribution à l'étude génétique d'un Ascomycète tétrasporé: *Podospora anserina* (Ces.) Rehm. [**Contribution to the genetic study of a tetrasporic ascomycete: *P. anserina* (Ces.) Rehm.**].
Rev. Cytol., Paris 1949 : **11** : 201–304.
Extensive experiments on the genetics of *P. anserina* are reported. Mating type and a series of morphological characters were each found to depend on single Mendelian genes, which appeared to pertain to a maximum of 4 linkage groups. The binucleate spores frequently give rise to heterocaryons, the relations of whose genetic components are analysed. One case of aberrant genetic behaviour is attributed, in all probability, to cytoplasmic inheritance.

869 Imšeneckiĭ, A. A. & Perova, K. Z.
(Amylolytic activity of rough *Aspergillus niger* strains).
Mikrobiologija (Microbiology), Moskva 1953 : **22** : 133–40. [Russian].

Productive rough strains with improved capacity for breaking down starch have been selected from a smooth strain of *A. niger*.

870 Bringmann, G.
Methoden der Selektion zur Steigerung der antibiotischen Wirksamkeit bei *Penicillium notatum*. **(Methods of selection to increase the antibiotic efficacy of *P. notatum*).**
Arch. Mikrobiol. 1950 : **15** : 85–148.

Methods of selection in cultures of *P. notatum* are discussed. Without continual artificial selection of the more virulent strains, a biological deterioration of the material takes place, due to the appearance of types deviating from the norm.

871 Wheeler, H. E.
Linkage groups in *Glomerella cingulata*.
Phytopathology 1953 : **43** : p. 489. (Abst.).

Investigations were carried out on 40 morphological and biochemical mutants, most of which were radiation-induced. Each mutant character appeared to be controlled by a single gene. Four linkage groups representing at least three chromosomes were detected. Group I included loci *A* and *B* for mating type: three alleles at each of these loci have been previously identified; one of the mutant genes was apparently a fourth allele at *B*. Stocks with as many as six genetic markers were established. The experiments indicated that the wild-type and mutant cultures used in previous studies were haploid.

872 Haxo, F.
Carotenoid formation of mutant strains of *Neurospora crassa*.
Biol. Bull. 1952 : **103** : p. 286. (Abst.).

N. crassa normally synthesizes an elaborate mixture of C_{40}-polyenes. Among eight mutant strains showing an altered polyene composition, four types have been recognized, characterized by (1) specific pigment block, e.g. elimination of the acidic fraction; (2) multiple pigment deficiencies comprising elimination of xanthophylls and most carotenes, reduced synthesis of hydrogenated polyenes, and normal phytoene content; (3) lack of carotenoid, and normal or enhanced formation of phytoene; and (4) a phytoeneless condition and considerable reduction in synthesis of one or more pigments.

873 Wheeler, H. E. & Driver, C. H.
Genetics and cytology of a mutant, dwarf-spored *Glomerella*.
Amer. J. Bot. 1953 : **40** : 694–702.

A mutant of *G. cingulata*, derived from a culture grown on a medium containing radiocarbon, produced ascospores approximately one-third the normal size. The character of dwarf spores was found to be controlled by a single mutant gene, dw^1. In single cultures, this gene also determined the position of the fusion nucleus and the spores in the ascus, and the occurrence of disintegration of nuclei undergoing division in the ascus, followed by partial or complete abortion of the ascus. In crosses, the nondwarf allele dw^+ was completely dominant in heterozygous cells, but only partially dominant in heterocaryotic cells. The data suggested that variations in the size of dwarf spores in asci heterozygous for dw^1 were due to a maternal effect resulting from a diffusible gene product.

874 Prout, T., Huebschman, C., Levene, H. & Ryan, F. J.
The proportions of nuclear types in *Neurospora* heterocaryons as determined by plating conidia.
Genetics 1953 : **38** : 518–29.

By plating macroconidia from a heterocaryon involving two nutritional mutants, under suitable conditions, the proportions of the heterocaryotic and two homocaryotic classes can be determined, the distribution of the two types of mutant nuclei among the macroconidia being assumed to be random. The theoretical basis of this method is examined. Experimental data on one of the three heterocaryons studied were consistent with the assumption of random distribution, but the other two provided evidence that nonrandom distribution frequently occurred; the possible causes of nonrandomness are discussed.

875 Tissieres, A., Mitchell, H. K. & Haskins, F. A.
Studies on the respiratory system of the poky strain of *Neurospora*.
J. biol. Chem. 1953 : **205** : 423–33.

Further evidence has been obtained that the "poky" strain at an early stage does not depend on the cytochrome system for terminal oxidation (cf. *PBA*, Vol. XXIII, Absts. 947 and 1737).

A flavinadenine dinucleotide enzyme system probably acts as oxidase in this cytoplasmically determined variant.

876 GARNJOBST, L.
Genetic control of heterocaryosis in *Neurospora crassa*.
Amer. J. Bot. 1953 : **40** : 607–14.

Data from crosses of the inositolless strain 37401 with the riboflavinless strain Y30539 indicated that two independent genes, designated *C* and *D*, determined the occurrence of heterocaryosis. Of the four genotypes *CD*, *cD*, *Cd* and *cd*, only *CD* formed stable, unisexual heterocaryons with the riboflavinless (*CD*) testers. The remaining three genotypes gave negative or erratic results with these testers. Gene *C* (*het–1*) was found to be situated 26·0 units from the centromere; its linkage relationships have not yet been determined. Gene *D* (*het–2*) is located in linkage group II, 39·3 units from the centromere.
The results of crosses of *cD*, *Cd* and *cd* genotypes of the inositolless strain to other biochemical mutants confirm that the presence of *C* and *D* in both strains is essential for the formation of stable heterocaryons.

877 MORTIMER, R. K. & TOBIAS, C. A.
Evidence for X-ray induced recessive lethal mutations in yeast.
Science 1953 : **118** : 517–18.

Asci originating from X-irradiated diploid cells showed a significant reduction in the percentage of viable spores, the fractions of germinating spores per ascus being indicative of segregation of lethal genic or chromosomal alterations. Irradiation experiments with triploid and tetraploid yeast have suggested that dominant lethal mutations may also be induced.

878 STAPP, C.
Zur Schanderlschen Theorie der Transmutation bestimmter Zellbestandteile höher entwickelter pflanzlicher Organismen zu Bakterien. (**On Schanderl's theory of the transmutation of certain cell components of more highly developed plant organisms into bacteria**).
Naturwissenschaften 1953 : **40** : 618–20.

The theory of the spontaneous conversion of yeast chondriosomes and granules into bacteria (cf. *PBA*, Vol. XXIII, Abst. 2432) is criticized. Experiments by the author, along the lines advocated by Schanderl, gave completely negative results.

879 KIROVA, K. A.
(**Morphological and biological properties of thermophilic yeasts selected from rye bread**).
Mikrobiologija (Microbiology), Moskva 1953 : **22** : No. 1 : 54–58. [Russian].

Saccharomyces minor strain m^r and *S. cerevisiae* strain c^r, capable of fermentation at 30–32° C and 38–40° C respectively, are described.

880 MISAILOVSKI, B.
(**Investigations into the indigenous wine microflora of Macedonia. Properties of some yeast strains**).
Zborn. Zemjod.-Ispit. Inst. Skopje/Ann. Agric. Res. Inst. Skopje 1952 : **1** : 325–38. [Macedonian].

Some pure strains of *Saccharomyces ellipsoideus*, selected in recent years at Skopje, Macedonia, are tolerant of high concentrations of sulphur dioxide; others are capable of fermenting wines of the sherry type.

881 SARACHEK, A. & LUCKE, W. H.
Induction of resistance to X-ray inactivation in *Saccharomyces* by pre-exposure to 2537Å ultraviolet radiation.
Experientia 1953 : **9** : 374–76.

When haploid or diploid suspensions of *S. cerevisiae* were irradiated with ultraviolet rays so that 5% survival was obtained, the X-ray resistance of a portion of the surviving fractions was greatly increased. Reasons are given for concluding that this increase was due to an ultraviolet-induced alteration in the cells, and not to the presence in the original population of a fraction of cells resistant to both X and ultraviolet irradiation; this result corroborates the suppression of X-ray-induced chromosome breakage by ultraviolet radiation reported in *Tradescantia* and *Drosophila* by previous investigators; thus chromosome aberrations are probably an important aspect of cellular inactivation by X rays. In contrast, no change in sensitivity to ultraviolet radiation occurred in survivors of an X-irradiated population.

882 MUNDKUR, B. D.
Interphase nuclei and cell sizes in a polyploid series of *Saccharomyces*.
Experientia 1953 : **9** : 373–74.

A yeast series consisting of *n*, 2*n*, 3*n* and 4*n* clones showed an increase in nuclear diameter and mean volume with chromosome number, the interphase nucleus being regarded as the spherical, Feulgen-positive extravacuolar area.

No evidence was obtained of spontaneous somatic doubling in haploid nuclei, as suggested by Ranganathan and Subramaniam (cf. *PBA*, Vol. XXIII, Abst. 147).

883 Roman, H. & Sands, S. M.
Heterogeneity of clones of *Saccharomyces* derived from haploid ascospores.
Proc. Nat. Acad. Sci., Wash. 1953 : **39** : 171–79.

In the heterothallic strains investigated, diploidization occurred in clones derived from haploid cells. The diploid cells were either homozygous or heterozygous at the mating-type locus. The heterozygotes differed from the homozygotes not only in mating reaction but also in growth habit and capacity to sporulate, suggesting that the mating-type locus has multiple effects. The heterozygotes were capable of sporulation, but incapable of fusion with other cells. The homozygotes, on the other hand, did not sporulate but were able to fuse with haploid and diploid cells of opposite mating type to produce triploid and tetraploid zygotes. The significance of these results in relation to techniques used in genetical experiments is discussed.

884 Winge, Ö. & Roberts, C.
The genes for maltose and raffinose fermentation in *Saccharomyces cerevisiae*, strain Yeast Foam.
C.R. Lab. Carlsberg 1953 : Sér. Physiol. : **25** : 241–51.

Raffinose fermentation in *S. cerevisiae* 'Yeast Foam' was found to depend upon a single gene, identical with the gene R_2 for raffinose fermentation in *S. chevalieri*. Previous investigations indicated that in *S. chevalieri* raffinose fermentation is determined by three genes R_1, R_2 and R_3 (cf. *PBA*, Vol. XXII, Abst. 2520). Complete linkage has been detected between the gene pair M_3m_3 for maltose fermentation and R_3r_3.

885 Lindegren, C. C. & Lindegren, G.
The genetics of melezitose fermentation in *Saccharomyces*.
Genetica 1953 : **26** : 430–44.

Evidence of a multiple series of alleles of the locus *MZ* has been obtained, the members of the series being differentiated by their adaptive response to maltose, turanose, sucrose, melezitose and α-methyl glucoside. Gene conversion is regarded as responsible for this series. The more efficient alleles are able to ferment all five sugars. The ability to ferment maltose is a highly stable property and may be retained after the alleles have lost control of the fermentation of other α-glucosides. The *MZ* system has previously been found to produce a single enzyme. The defects of the locus *MZ*, corresponding to the different alleles, can only be detected by means of the highly sensitive Durham-tube test. The different substrates, it is postulated, impinge on the gene surface to produce an excitation which results in the non-specific elicitation of the enzyme α-glucomelezitase. The *MZ* system readily loses the capacity to receive stimuli from some exciters, especially α-methyl glucoside and melezitose. Since the different exciters comprise a series of structurally related compounds, it is suggested that the gene is stimulated by their specific configurations, and furthermore, since degradation occurs in a fairly regular pattern, that certain parts of the gene may be more readily subject to alteration than others. Certainly gene and enzyme are distinct. Evidence has also been obtained of linkage of *MZ* with *MA* and *MG*.

886 Jinks, J. L.
Linkage between two polymeric genes for raffinose and sucrose fermentation in yeasts.
C. R. Lab. Carlsberg 1953 : Sér. Physiol. : **25** : 252–57.

Data on the segregations for raffinose fermentation obtained with the repulsion heterozygote from the cross R_2r_1 x r_2R_3 and the coupling heterozygote from the cross r_2r_3 x R_2R_3 are interpreted as evidence of linkage between R_2 and R_3, with a crossover value of 42·3% (cf. *PBA*, Vol. XXII, Abst. 2520). Lindegren and Lindegren (cf. *PBA*, Vol. XXIII, Abst. 949) have claimed that *MA*, *MG* and *SU* are in one linkage group, but these genes segregated freely in both coupling and repulsion crosses, the demonstration of linkage being confined to some of the repulsion crosses. Discussing the possibility of linkage between *MG* and *SU*, the author suggests that the results secured by Lindegren and Lindegren can be best explained on the assumption that more than one *SU* locus was involved. Experimental data have been obtained which confirm the close linkage between M_1 and R_1, previously reported by Winge and Roberts (cf. *PBA*, Vol. XXII, Abst. 2520). The apparent rarity of linkage between the genes determining fermentation suggests that yeast possesses a number of chromosomes, or that chiasma formation occurs with a higher frequency than is normally found in higher organisms.

887 Lindegren, C. C., Braham, J. E. & De Dios Calle, J.
Heterosis in *Saccharomyces*.
Nature, Lond. 1953 : **172** : 800–02.

Investigations were carried out on the interactions of the genes *MA* and *MG* in diploid hybrids; these genes control the production of maltase and α-methyl glucosidase, respectively. The haploids used in mating had the genotypes *MA MG*, *MA mg*, *ma MG* and *ma mg*. All hybrids with either *MG/MG* or *MG/mg* were more active in fermenting maltose than their haploid parents, in spite of the fact that in the hybrids heterozygous for *MA* the gene "concentration" for *MA* was reduced by one-half. The average fermenting activity of hybrids grown on maltose and tested on α-methyl glucoside was higher than in the haploids, in spite of cases of heterozygosity for *MG*. The ability to produce gluco-sucrase was also enhanced in the hybrids. It is suggested that the increased production of maltase is due to a group of modifiers, of which *MG* is the chief; another member of this group may affect the production of gluco-sucrase. As postulated for *MZ* (cf. *PBA*, Vol. XXIII, Abst. 1742), *MA* may be a receptor upon which the substrate acts, producing an impulse which finally results in the formation of the appropriate enzyme. The effect of *MG* on *MA* may be to enhance the impulse connecting the locus *MA* with the site of enzyme production. Thus, in the presence of *MG*, the impulse induced from *MA* by maltose may elicit the production of α-methyl glucosidase, some of which can be converted into maltase. Another locus may cause the impulse from *MA* to elicit the formation of glucosucrase, which is possibly convertible into α-methyl glucosidase.

888 Lindegren, C. C. & Pittman, D. D.
The induction in a *Saccharomyces* sp. of the gene-mutation controlling utilization of galactose by exposure to galactose.
J. gen. Microbiol. 1953 : **9** : 494–511.

The phenomenon of long-term adaptation to galactose had been previously found to be due to mutation and subsequent selection of the mutant in the presence of galactose (cf. *PBA*, Vol. XX, Abst. 1485). No competition was detected between the original nonfermenter stock and the derived mutant capable of galactose fermentation, when a mixed population was grown on glucose medium. By means of variance analysis, fluctuation-redistribution tests and chemostat experiments, it was proved that mutation to the ability to ferment galactose did not arise spontaneously. Exposure of nondividing, nonfermenter cells to galactose induced the mutation to the fermenter type in a small but relatively constant number of cells, whereas exposure to glucose, ribose or galactose was ineffective. Prolonged exposure of the cells on galactose agar plates increased the number of mutations. It is inferred that the induction of the mutation results from the impingement of galactose on the gene surface so as to model this surface into a "mirror-image of the substrate."

889 Halbinger, R. E.
Selección y ensayo de adaptación de levaduras. (**Selection and adaptation of yeasts**).
Rev. argent. Agron. 1953 : **20** : 130–40.

Twenty-seven different yeast strains were cultured in malt extracts to which increasing doses of ethyl alcohol were added. Only 11 of them survived an alcoholic content of 16°, 4 survived 17° and only 1 survived 18°. The same strains were subjected to gradually increasing temperatures; all races survived up to 38° C but began to show reduced fermentative power at 39° C and above. When the SO_2 content was increased gradually, some races were eliminated at concentrations of 36 g. per hl., others by 54 and so on up to 270, and one race at least survived in concentrations of 450; this was a hybrid yeast from the University of Cuyo and was the same strain that showed the maximum alcohol resistance.
Attempts to select resistant strains by applying high doses of alcohol, SO_2 and temperature together were however unsuccessful.

890 Cherewick, W. J.
Smut diseases of cultivated plants in Canada.
Publ. Dep. Agric. Canada 1953 : No. 887 : Pp. 58.

This general survey includes sections on the reproduction of the smut fungi, their physiological specialization, hybridization and genetics. In discussing control methods, reference is made to the resistance or susceptibility shown by cereal varieties.

891 Fischer, G. W.
Induced hybridization in graminicolous smut fungi. II. *Ustilago striiformis* x *U. bullata*.
Phytopathology 1953 : **43** : 547–50.

Hybrids obtained from the cross *U. striiformis* var. *hordei* x *U. bullata* showed the characters of the former to be dominant in the F_1 generation. In the F_2 segregation occurred, but some

of the segregates appear to have been suppressed. No hybrids combining characteristics from both parents were obtained. All the *U. striiformis* var. *hordei* segregates had echinulate spores of uniform pigmentation, and all the bullate types verrucose spores with darker equatorial pigmentation. (See also *PBA*, Vol. XXII, Abst. 160).

892 DeVay, J. E. & Stakman, E. C.
Amino-acids synthesized by lines of *Ustilago zeae* of different sex.
Phytopathology 1953 : **43** : p. 470. (Abst.).

Different lines varied quantitatively and qualitatively in the free aminoacid content of liquid shake cultures. This variability was, however, as great among lines of the same sex group as among lines from different groups. No marked differences in content of bound aminoacids was found in lines from the different sex groups.

893 McGinnis, R. C.
Cytological studies of chromosomes of rust fungi. I. The mitotic chromosomes of *Puccinia graminis*.
Canad. J. Bot. 1953 : **31** : 522–26.

During prophase in cells of germinating sporidia of *P. graminis*, the chromosomes were united in a spireme-like structure, and the limits of individual chromosomes could not be detected. At metaphase a haploid number of six chromosomes was counted, and apparently residual terminal attractions were observed, the six chromosomes forming three loose pairs. It is suggested that *P. graminis* has a basic chromosome number of 3; the problems of speciation and pathogenicity are briefly discussed in relation to this possibility.

894 Eggertson, E.
An estimate of the number of alleles at the loci for heterothallism in a local concentration of *Polyporus obtusus* Berk.
Canad. J. Bot. 1953 : **31** : 750–59.

In a sample of 24 fruit bodies of *P. obtusus* collected at Chalk River, Ont., the presence of 39 alleles at each of the two loci for heterothallism was detected. Using this figure in the formula given by Whitehouse (cf. *PBA*, Vol. XX, Abst. 133), an estimate of 112 alleles at each locus was obtained for the total local population.

895 Raper, J. R.
Auto-mutagenesis in the mushroom, *Schizophyllum commune*.
Science 1953 : **118** : p. 574. (Abst.).

Mutagenesis in heterocaryons having the factor *A* for mating type in common is reported (cf. *PBA*, Vol. XXIII, Abst. 965).

896 Ranque, J. & Depieds, R.
Modifications des propriétés biochimiques des souches de *Candida albicans* au cours de leur vieillissement, leur rapport avec les transformations en formes "rough." (**Modifications in the biochemical properties of cultures of *C. albicans* with aging, and their connexion with transformations into "rough" forms**).
CR Soc. Biol., Paris 1952 : **146** : 479–81.

In addition to various transient changes noted in cultures of *C. albicans*, the authors report irreversible changes in fermentative capacity and from smooth colonies to rough or membranous.

897 Tinline, R. D.
The inheritance of some characters in *Helminthosporium sativum*.
Phytopathology 1953 : **43** : p. 487. (Abst.).

Colony colour and mating type in *H. sativum* were independently inherited, each being controlled by a single factor.

898 Hawn, E. J. & Vanterpool, T. C.
Preliminary studies on the sexual stage of *Rhizoctonia solani* Kühn.
Canad. J. Bot. 1953 : **31** : 699–710.

Single-basidiospore cultures of *Rh. solani* differed among themselves and from the parent strain (RF6–20) in morphology, cultural characters, growth rates, and pathogenicity on the flax variety Royal. Heterozygosity in RF6–20 was thus indicated. Evidence was also obtained that the strain was homothallic. The diploid nucleus of the basidium apparently contained 12 chromosomes. The mature basidiospores were predominantly binucleate.

899 Ziljber, L. A.
(**The nature and origin of viruses**).
Mikrobiologija (Microbiology), Moskva 1953 : **22** : No. 1 : 81–94. [Russian].

Literature on the origin of viruses is discussed in the light of Lepešinskaja's research (cf. *PBA*, Vol. XXI, Abst. 1509). Primitive forms of viruses are regarded as living substance, capable of metabolic activity without cellular organization.

900 Suhov, K. S.
(**The evolution of species in viruses**).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1953 : No. 3 : Ser. Biol. : 5–15. [Russian].

Mičurinite theories on the evolution of viruses are discussed in the light of recent research published in the Russian and English languages.

901 Weigle, J. J. & Dulbecco, R.
Induction of mutations in bacteriophage T3 by ultra-violet light.
Experientia 1953 : **9** : 372–73.

The typically virulent phage T3 was irradiated with a dose of ultraviolet that resulted in a surviving fraction of 9.10^{-6}, and plated on a mixture of two strains of *Escherichia coli* which had received a dose of ultraviolet six times smaller than that given to the phage. The ultraviolet-inactivated phage particles were reactivated by the irradiated bacteria. The phage thus reactivated produced twelve times more *h* mutants for type of host range and ten times more mutants for plaque morphology than the control. Mutants have been similarly induced in the temperate phage.

902 DeMars, R. I.
Chemical mutagenesis in bacteriophage T2.
Nature, Lond. 1953 : **172** : p. 964.

Phage from bacteria treated with proflavine produced a higher number of mutants *r* and *w* for plaque type than phage from untreated bacteria.

903 Levinthal, C. & Visconti, N.
Growth and recombination in bacterial viruses.
Genetics 1953 : **38** : 500–11.

Three basic processes in phage replication are postulated: (1) multiplication of the vegetative, noninfective particles; (2) mating of these particles to produce recombinants; and (3) irreversible withdrawal of particles from the vegetative pool to form mature infective phage (cf. *PBA*, Vol. XXIII, Abst. 1767). From experiments on lysis-inhibited bacteria infected with a mixture of *r* and r^+ phages, it has been found that both the frequency of recombinants in the pool and the number of phage particles accumulated by withdrawal and maturation increase at a constant rate for a period of approximately 60 minutes. Phage multiplication and mating could be related on the basis of the hypothesis that the pool remained constant at a size of about 30 particles, each particle mating and duplicating approximately once every two minutes.

INSECTICIDES

904 Otsuki, T.
(Studies on polyploidy in pyrethrum. I. Comparison of the characteristics, morphology of the organs, and pyrethrin content of polyploid strains).
Hokkaido Nogyo Shiken Jo Iho/Res. Bull. Hokkaido Nat. Agric. Exp. Sta. 1953 : No. 64 : 12–21. [Japanese].

Diploid, triploid and tetraploid strains were investigated in respect of number and size of flowers, pollen and stomatal size, pollen fertility and content of pyrethrins. The polyploids had larger flowers and were less fertile than the diploids, but the latter were highly variable in respect of fertility. The triploids had a slightly higher pyrethrin content than the diploids or tetraploids; the latter had the lowest content of pyrethrin I.

CROP PLANTS

905 **Report on the activities of FAO under the expanded technical assistance program for 1952/1953.**
FAO UN, Rome 1953 : Pp. 88.

Technical assistance in crop selection and breeding is being given to the Governments of Afghanistan, Egypt, Iran and several other countries.

906 **The work of FAO 1952/53.**
FAO UN, Rome 1953 : Pp. 46.

Cereal hybridization. The sixth annual meeting of hybrid maize breeders from countries in Europe and the Mediterranean region was held in Portugal in 1952 (cf. Abst. 288). The results of the uniform cooperative tests of North American hybrids have made possible the rapid expansion in the cultivation of suitable hybrids in several countries (cf. Abst. 1064).

The Working Party of the International Rice Commission held its third meeting at Bandung, Indonesia, in 1952 (cf. *PBA*, Vol. XXIII, Abst. 2701).

Meetings of the Committee on Wheat and Barley Breeding in the Near East, held in Istanbul in 1952 (cf. *PBA*, Vol. XXIII, Abst. 973) and in Cairo in 1953, respectively, have led to plans for cooperative investigations to strengthen the national breeding programmes.

Pasture and Fodder Crops. The first meeting of the Working Party on Mediterranean Pasture and Fodder Development took place in Rome in 1952; the second followed in Algiers, in April 1953 (cf. Abst. 1145).

International catalogues. The World Catalogues of genetic stocks of wheat and rice now include 1353 entries from 27 countries, and 863 entries from 32 countries, respectively (cf. Absts 991 and 1113). The World List of Plant Breeders has been expanded (cf. *PBA*, Vol. XXIII, Abst. 1817).

Seed production and distribution. Seed and other planting materials of many crops were distributed for experimental purposes.

In 1952, the Organization for European Economic Cooperation carried out a survey of the production, testing and distribution of high quality seed in 11 of 16 European countries.

907 **Committee for Colonial Agricultural Animal Health and Forestry Research, Eighth Annual Report (1952-1953).**
Colonial Research 1952–1953. HM Stationery Office, London, 157–203.

Brief reports of crop breeding are included. Most of the work in progress has already been referred to in *Plant Breeding Abstracts.*

908 **Agriculture in the Near East. Development and outlook.**
FAO UN, Rome 1953 : Pp. 78. (Mimeographed).

Part I gives the report of the third FAO Regional Meeting on Food and Agricultural Programs and Outlook in the Near East, held in Cairo, Egypt, 1–9 September 1953. Among the topics referred to are the meetings of the FAO Committee on Wheat and Barley Breeding in the Near East, in Turkey in 1952 (cf. *PBA*, Vol. XXIII, Abst. 972) and in Egypt in 1953 (cf. Abst. 906), respectively. A 1953/1954 programme has been initiated which will operate in 14 countries, and include 230 and 130 varieties of wheat for tests of rust and bunt reaction, respectively. Trials are also to be carried out on 60 barleys. The establishment of a Rust Institute, preferably in Egypt, was recommended.

The second meeting of the Working Party on Mediterranean Pasture and Fodder Development was held in Algiers in 1953 (cf. Abst. 1145).

Part II gives the working paper prepared for discussion on the Current Development of and Prospects for Agriculture in the Near East. It includes in chapter VI a section on seed improvement (pp. 59–61). Breeding programmes have so far been established in only a few countries, notably in Egypt and Turkey.

909 **Twenty-sixth Annual Report of the Agricultural Research Institute of Northern Ireland, Hillsborough, Co. Down 1952-53** : Pp. 38.

Barley. In a trial of the response of varieties to large dressings of nitrogen, Herta showed the least lodging.

Flax. Wilt-resistant hybrid strains were selected.

910 Sengbusch, R. v.
Ein Beitrag zur Entstehungsgeschichte unserer Nahrungs-Kulturpflanzen unter besonderer Berücksichtigung der Individualauslese. (**A contribution to the evolutionary history of our cultivated food plants with special reference to individual selection**).
Züchter 1953 : **23** : 353–64.

The evolution of different species of the genus *Lupinus* from the wild form to the cultivated edible form is described. *L. albus* and *L. mutabilis* have been cultivated for several thousands of years; *L. luteus,* however, has become a cultivated edible plant in only a quarter of a century.

The author then gives a brief history of the improvement of plants by selection. Poisonous or unpleasant tasting plants could not be improved for edible purposes until quite recently, as the selector had no means of establishing the existence of chance mutants which might give rise to an edible variety. Now, however, it should be possible, through scientific selection, to develop edible strains from inedible parent material.

911 Puhaljskiĭ, A.
(**Applying scientific achievements to socialist agriculture**).
Kolhoznoe Proizvodstvo (Collective Farming) 1953 : No. 12 : 41–44. [Russian].

A survey of breeding research at Odessa refers to several new varieties of cereals and forage, oil and fibre plants and horticultural crops, besides those described below.

Cereals. The winter wheat Odessa 16 shows resistance to drought, bunt and smut, is earlier than Odessa 12 and less susceptible to lodging than Odessa 3. It is hardier and more productive than either variety and tolerant of variable temperatures in the spring. The new maize Kremnistaja Skorospelaja [Early Flint], which reaches maturity in August and outyields other early varieties, is interesting as a predecessor to winter wheat in crop rotation. Another maize, Odessa 10, producing 100 c. kernels and 500–600 c. green matter per ha., is regarded as a good variety for ensilage. The new winter barley, Odessa 17, is hardier and yields more grain than Krasnyĭ Dar [Red Gift]. It shows resistance to drought and may yield 250–300 c. per ha. of green substance when grown for forage. It was obtained by hybridization between some spring barleys trained for a winter habit.

Potato. The new seedlings 357/47 and 71/47 outyield other varieties by 5–45 c. per ha. A

new variety, Kurjer Odesskiĭ Uluščennyĭ [Improved Odessa Courier], is being tested.

912 Huttunen, E., Brummer, V., Heikinheimo, A. & Pohjanheimo, O.
Tuloksia vertailevista lajikekokeista Tammistossa 1938–45. (**Results of comparative variety trials at Tammisto, 1938–45**).
Siemenjulk. Hankkijan KasvinjalosLaitos Tammisto 1946 : 21–108.

Spring wheat. Two new varieties, Tammi and Kimmo, have been introduced; they are notable for their strong straw, baking quality and high degree of resistance to brown rust. These and other varieties are compared with Diamant [Diamond], the most commonly cultivated variety. The Swedish varieties Brons [Bronze] and Kärn [Kernel] are also promising.

Winter wheat. Finnish varieties show greater winter hardiness than foreign.

Oats. The recently introduced variety Eho [Graceful], particularly strain a6933, shows the greatest promise.

Winter rye. With the exception of the Estonian Sangaste rye, foreign varieties are less satisfactory than Finnish on account of their lesser winter hardiness.

Barley. Various native and foreign six-rowed varieties are compared with Vega. Tammi yields well and shows a high degree of resistance to smut. Binder is taken as the standard of comparison for two-rowed barleys. Helmi [Pearl] is more satisfactory as a malting barley and Louhi thrives on acid soils, although unsuitable for malting. The Swedish varieties Balder and Ymer also show promise.

Forage crops. Data are given on varietal trials of timothy, fescue and ryegrass; Tammisto red clover shows promise, and also the Danish Øtofte Alsike clover.

Root crops. Varietal trials of mangels, fodder sugar beet and sugar beet are reported.

Potato. Tammiston Aikainen [Tammisto Early] is growing popular in southern Finland. Comparative trials are reported for numerous second-early and late varieties.

Pea. Of culinary peas, Prof. Sauli is the most outstanding. Artturi is the most valuable field pea.

913 Huttunen, E.
Tammiston uusimmat kauppaan lasketut jalosteet. (**The newest improved varieties placed on the market from Tammisto**).
Siemenjulk. Hankkijan KasvinjalosLaitos Tammisto 1946 : 128–31.

The following improved varieties have been put on the market since 1938.

Tammi spring wheat (04070) resulted from a cross between McIntosh and 01214. The straw is especially strong; the grain ripens nearly a week earlier than Diamant [Diamond].

Kimmo spring wheat (05910), raised from a population obtained from Russia in 1926, has a higher hectolitre weight than other Finnish spring wheats, excellent baking properties and a high degree of resistance to brown rust and bunt.

Helmi barley (03639), obtained from Binder x Piikkiö, is the earliest two-rowed barley yet obtained; it is unexacting as regards cultural conditions and heavy yielding. The straw is strong.

The Eho [Graceful] oat (a6595), obtained from Kytö x Stjärn [Star] has thin hulls and strong straw. It ripens earlier than Kultasade II [Golden Rain II] and the yield and drought resistance are satisfactory.

The Professori Sauli pea (0377) was obtained from a cross between a Dutch garden pea and (Torsdag [Thursday] x Folger) F_1. It is a good pea for cooking and canning and is sweet, with large pods and seeds.

914 Hankkijan harjoittaman jalostustyön tuloksia 1946–49. Lajikekokeet. (**Results of plant breeding work carried out by Hankkija 1946-49. Variety trials**).
Siemenjulk. Hankkijan KasvinjalosLaitos Tammisto 1950 : 17–112.

An exhaustive account is given of field trials carried out by the Hankkija Plant Breeding Station.

Spring wheat. Efforts to raise a variety which ripens sufficiently early for cultivation in central and northern Finland have resulted in the promising strains a 3278 (Tammi x 06635) and a 3455 (Hopea x 04609). For southern Finland, Diamant II [Diamond II] and Kärn [Kernel] are the most generally suitable.

Winter wheat. Breeding work has been directed to the production of a variety superior to Varma [Sure], the most commonly cultivated winter wheat, in winter hardiness, and at least equal to it in other respects, and also to finding a variety with greater resistance to overwintering diseases.

Oats. Hybridization has been pursued for the production of early varieties with strong straw, good drought resistance, and yet able to ripen in cool wet seasons. The new variety Eho [Graceful], released in 1946, has been successful in Central Finland; Sisu [Courage] remains the highest yielding in northern areas.

Winter rye. Breeding for stronger straw has been the principal aim. Some promising results have been obtained from hybrids involving Finnish and foreign varieties such as 01075 (Oiva [Excellent] x Våsa II) and 01084 (Våsa II x Vjatka).

Barley. Of six-rowed varieties, Tammi and Edda are both high yielding and with strong straw, but have the disadvantage of small kernels. The new strain a 4459 has a good yield, strong straw and large kernels. Of two-rowed varieties, Balder, whose use is spreading, has too short a straw. The foreign varieties Rigel and Herta deserve further trial and also the new strain a 4615 (Louhi x Opal), which is promising even on acid soils.

Poa pratensis. The Estonian variety Adila gives the best hay yield, but the Swedish strains Gullåker and Primo have better stem formation.

Timothy. The variety Tammisto was put on the market in 1948. Extensive comparative data of crop yields, both first cut and aftermath, of numerous European and American strains are reported. Aftermath is generally greater among Swedish, Danish and American strains than in Finnish forms.

Ryegrass. This species may prove valuable for temporary leys. The Swedish variety Valinge is the most promising, but has a poor seed yield.

Meadow fescue. Tammisto, a pasture type, and Paavo, a hay type, are the best Finnish strains but inferior to foreign varieties in stem formation. Øtofte is a valuable variety for southern Finland.

Red fescue. The Swedish varieties Reptans and Hammenhög show greater promise than the Tammisto strain. The latter, however, has good overwintering properties.

Alsike clover. The Tammisto strain has proved superior to the Øtofte type from which it was derived.

Red clover. The Tammisto strain compares very favourably with both foreign and local varieties. Breeding work is aimed at hardy and high-yielding varieties, the strains Ta s 8 and Ta s 10 being the most promising.

White clover. Trials revealed higher yields from Swedish and Danish varieties when conditions are favourable, but their winter hardiness is inferior to the Tammisto strain.

Root crops. Field trials of swedes, mangels and fodder sugar beet are reported.

Potato. Field trials of early varieties show the German varieties Sieglinde and Frühbote to be the most useful, the latter being earlier but more susceptible to virus diseases. Both are wart immune. Tammiston Aikainen [Tammisto Early] is virus resistant but has small tubers. In the early main-crop class, Pellervo (= Frühnudel), a fodder potato, has given the highest yields. Of late main-crop varieties, Paul Wagner has the highest tuber yield; the new strain 01101 had the highest starch content; and Aquila proved immune to *Phytophthora.*

915 Sauli, J. O.
Tammiston kasvijalosteiden historiikkia. (**History of plant breeding at Tammisto**).
Siemenjulk. Hankkijan KasvinjalosLaitos Tammisto 1950 : 131–35.

A synopsis is given of the different varieties of wheat, oats, barley, rye, potatoes, swedes, peas and herbage plants produced at Tammisto, together with notes on their origin and qualities.

916 Virri, T. J.
Satakuntan kasvinviljelyskoeaseman koetuloksia v. 1945–52. (**Experimental results of the Satakunta Field Station during 1945-52**).
Valt. Maatalousk. Tiedon. 1953 : No. 231 : Pp. 45.

The results of field variety trials, carried out for the most part between 1945 and 1952, are presented. The comparative yields, growing period and other agronomic characters are given for several varieties of spring wheat, barley, oats, peas and potatoes.

Spring wheat. Kärn II [Kernel II] and Timantti II [Diamond II] gave the best yields on soils of pH 5·6–6·0. Below this pH their yield was poor.

Barley. Balder appears to require good growing conditions and does not stand a very acid soil.

Oats. Sisu [Courage] appears to be the best variety at Satakunta but for areas liable to early autumn frosts is too late in ripening.

Peas. Ilo [Gaiety] and Sinikka do well intermixed with Sisu oats.

Potatoes. Siikli has given the best yield, but suffers from frost and drought; it is early, disease-resistant, a good keeper and has a superior flavour. Johanna is slightly later, and recommended for industrial purposes. Olympia gives moderate yields and keeps adequately. Ruusunlehti [Rosafolia] is the best keeper, and valuable industrially, although poor-yielding in dry summers.

917 Andersson, G.
Utsädesföreningens extra möte under lantbruksveckan 1953. (**The Seed Association's special meeting during the agricultural week 1953**).
Sverig. Utsädesfören. Tidskr. 1953 : **63** : 391–93.

The chairman, Count Raoul Hamilton, referring to the achievements of the association and its branch stations, instanced the tetraploid turnip Sirius (cf. Absts. 957 and 1204) and the advances made in oil crop breeding (cf. Absts. 1360 and 1361).

E. Åkerberg's address on aims and results obtained in plant breeding at the Ultuna Station was discussed by Å. Åkerman, who stressed the importance of the station and its work on problems relating to quality. G. I. Törnqvist read a report on the work of the Upper Norrland Station.

918 D.L.F.s Generalforsamling 1953. (**General meeting of the DLF, 1953**).
Tidsskr. Frøavl 1953 : **21** : 221–28.

In this report (cf. *PBA*, Vol. XXIII, Abst. 981) of the Danish Farmers' Associations for Seed Production a new wheat, Øtofte 56, that has done well in competition with Eroica receives favourable mention.

Official approval of the following strains of grasses, after tests at the Øtofte, Roskilde and Store Lundgaard experimental stations, is announced: the cocksfoot strains Roskilde II and Sildig Roskilde II [Late Roskilde II]; and the meadow fescue strains Tidlig Øtofte II [Early Øtofte II], Sildig Øtofte II [Late Øtofte II] and Øtofte II.

919 Algemene veredelingsdagen 1951. (**General plant breeding meeting 1951**).
Meded. Inst. Vered. TuinbGewass. 1952 : No. 32 : Pp. 120.

The opening speech gives an account of the Wageningen Plant Breeding Institute and of its work during 1950. Topics discussed at the meeting included the following:

Banga, O. De verdere ontwikkeling van de practijkproeven volgens het Deense systeem. (The further development of variety trials after the Danish system). (pp. 9–19).

Rules under which variety trials of vegetables were held during the period 1948–50 are reviewed, together with problems arising in judging the different crops.

Kronenberg, H. G. In welke opzichten is veredeling van klein-fruit gewenst en mogelijk? (In which respects is breeding in soft fruits desirable and possible?) (pp. 59–79).

The question of breeding strawberry, raspberry, red and black currants, and gooseberry varieties acceptable to grower and consumer, and possessing increased vigour and resistance to disease, is discussed. Data on a number of varieties are tabulated.

ter Pelkwijk, A. J. Perspectieven voor nieuwe kleinfruit gewassen. (General outlook for new soft fruit crops). (pp. 80–91).

It is suggested that several species of wild fruit could be improved by selective breeding and hybridization. Among these are *Amelanchier laevis* and *A. stolonifera*. Wild blackberry varieties could also be used to improve cultivated stock. The genera *Rosa, Berberis, Actinidia, Vitis, Prunus, Sorbus* and *Lonicera* still possess reserves of wild species which could be utilized by the plant breeder.

920 Rapport d'activité 1952. (**Report on work, 1952**).
Landw. Jb. Schweiz. 1953 : 67 : 746–984.

The Swiss Federal agricultural research stations have carried out variety trials of agricultural and horticultural crops in addition to the work recorded below (cf. *PBA*, Vol. XXIII, Abst. 2477):—

Wheat. Crosses were made between (1) winter varieties to obtain forms resistant to lodging and diseases; and (2) spring varieties to combine the productivity of German varieties with the high quality and rust resistance of Canadian wheats.

The hybrids of Probus and MC 245 with *Triticum timopheevi* and *T. persicum* have proved almost completely sterile. New crosses have been made between Swiss varieties of *T. vulgare* and different forms of *T. timopheevi, T. dicoccum, T. durum, T. turgidum* and *T. persicum*.

Intergeneric crosses were made between *Triticum* and *Secale, Agropyron* and *Triticum*, and *Aegilops* and *Triticum*. The Voldagsen TA 7 hybrids, from a cross between *Agropyron* and *Triticum*, combine high resistance to rusts with satisfactory fertility.

The Swiss research stations collaborated with the Netherlands Foundation for the Coordination of Cultivation and Research on Bread Cereals (cf. *PBA*, Vol. XXIII, Abst. 2591) in the study

of the cold requirements for earing in 70 varieties of winter and alternative wheats sown on a series of different dates.

Morphological and physiological studies of cultivated varieties bred at Lausanne were continued, the material under observation being a collection of indigenous wheats comprising ten samples of MC 245, ten of MC 268 and two of MC XXII.

Rye. Material undergoing selection for fertility includes tetraploid Rothenbrunnen and F_1 plants from tetraploid Berna x tetraploid Petkus. A new series of tetraploids has been raised by colchicine treatment of Rothenbrunnen and Witzwil. The fertility of tetraploid Petkus in isolated plots and in proximity to the diploid form is being investigated.

Maize. In Valais, 25 types of local maize were collected, at altitudes ranging from the plain of the Rhone to an altitude of 1100 feet, to form a collection for breeding self-fertilized indigenous lines.

Top crosses of selfed lines from the Oerlikon Station and from the Clermont-Ferrand research station in France are being tested at the Federal Substation of Vétroz to discover the best lines for hybrid combinations for growing in Switzerland.

The Lausanne Station is participating in the international tests of hybrid maize, organized by FAO.

Barley. By colchicine treatment 71 tetraploids of the indigenous, autumn variety Riniker and 15 of the spring barley Austral were obtained; a few of these plants are completely tetraploid, the rest bear only a few modified stems.

Fertility is being determined in 98 tetraploid plants of Kenia and 41 of Freja.

In an attempt to increase the fertility of the tetraploid strain of Isaria, 16 lines, showing adequate fertility, are being compared with the diploid form.

Forage plants. Selection of red clover at high altitudes to obtain a hardy, persistent type for the meadows in mountainous parts is in progress.

Material has been collected for ecotype studies of *Onobrychis sativa*, *Dactylis glomerata* and *Festuca pratensis*.

Tobacco. Research on hybrids resistant to mosaic is being carried out. The variety MC Brun [MC Brown] and also the hybrids, (MC Brun x MC Jaune [MC Yellow]) x MC Brun or MC Jaune, are undergoing selection to improve MC Brun, which is deficient in chlorophyll, and also to obtain a type that colours better at the yellowing stage.

Comparative trials have shown MC Jaune Résistant [MC Yellow Resistant] to be superior to MC Jaune, especially in resistance to root rot due to nematode and *Thielaviopsis* attack.

Pome and stone fruits. Among the crosses made to improve the Franc-Roseau apple, the hybrid 177/2 (Franc-Roseau x Reinette Oetwiler) seems promising. Hybridization of pears and of apricots is in progress.

921 Manoliu, M.
(The development of the biological sciences in democratic Rumania).
Priroda (Nature) 1953 : No. 9 : 53–56. [Russian].

New varieties of economic plants developed in Rumania, where Mendelian genetics has been rejected in favour of Mičurinite agrobiology, are described.

Wheat. At the Baragan Research Station, a winter wheat, Baragan 77, which is more productive and has better baking and milling properties than A 15, has been obtained by an unspecified Mičurinite method. Another winter wheat, Tyrgu Frumos 16, from Red Rumanian x A 15, was bred at Tyrgu Frumos. It is adapted to the steppe climate of northern Moldova where it yields 9–10% more grain than standard varieties. A new spring wheat, Ikar 142, does well in Dobrogea and Muntenia. It was obtained by single plant selection from a local variety Ulka, shows resistance to loose smut and rust and has vitreous grain.

Fibre plants. An *Abutilon* variety, Ikar 3, which yields 4500–8900 kg. dry stems per ha., was obtained by environmental training of an introduced Mongolian population. A productive variety of Kenaf, Ikar 2, was also obtained by environmental training.

Fruit trees. Mention is made of a drought resistant apple hybrid from Golden Pearmain x Jonathan and of Hortensia, a new large-fruited cherry variety, obtained by using the cherry variety Pandi as a mentor stock for a hybrid between a sweet and a disease-resistant sour cherry. A new peach resistant to pests is referred to.

922 **Agriculture in Asia and the Far East. Development and outlook.**
FAO UN, Rome 1953 : Pp. 163. (Mimeographed).

Part I provides the report of the FAO Regional Meeting on Food and Agricultural Programs and Outlook in Asia and the Far East, held in Bangalore, Mysore State, India, 27 July–5 August 1953. It contains a section on projects

for raising crop yields, including rice breeding at Cuttack, India.

Part II presents the working paper prepared by FAO for discussion at the Regional Meeting and revised in the light of additional information furnished at the meeting. The section entitled "Production and Distribution of improved seed" (pp. 96–104) in Chapter V refers to breeding carried out under the auspices of the International Rice Commission (cf. *PBA*, Vol. XXIII, Abst. 2701). This programme has been extended until 1956, to increase the numbers of *indica* parents and to undertake back-crossing of the more sterile F_1 plants. A survey is also given of the achievements and present status of rice breeding and seed production in Ceylon, India, Pakistan (East Bengal), Burma, Thailand, Viet-Nam, Malaya, Indonesia, the Philippines, Japan and South Korea.

923 **Proceedings of the Second Pakistan Science Conference, Karachi, 1950** : Pp. 89.

Section I. Agriculture, animal husbandry and forestry: botany, entomology (pp. 1–38).

Majeed Ahmad. Mating systems in yeasts, Saccharomyces. *(p. 9).*

See *PBA*, Vol. XXIII, Absts. 158, 2451 and 2453.

Shah, S. M. I. & Sulyman, M. Hybrid vigour in maize. (pp. 10–11).

At the Agricultural Research Station, Tarnab, North-West Frontier Province, the possibility of using not only the F_1 but also the F_2, F_3 and subsequent generations is being explored. The F_1, F_2 and F_3 of the double cross (Swabi White x Peshawar White) x (Pride of Saline x Oklahoma) were superior to either single-cross parent in yield and protein content.

Shah, S. M. I., Sulyman, M. & Ghulam Mehbub. Inter-varietal hybrid vigour in maize. (p. 11).

F_1 hybrids between commercial varieties and promising introductions were studied at Tarnab. Swabi White x Oklahoma gave outstandingly high yields of grain.

Sardar Khan, Abdur Rashid Khan & Muhammad Nasir Khan. Some breeding investigations on gram (Cicer arietinum *L.) in the Punjab. The linkage of factors. (p. 11).*

At the Agricultural College and Research Institute, Lyallpur, Punjab, the gene *P* for flower colour was found to be linked with *G* and *Y* for seed colour. Linkage was also detected between the genes for seed surface and seed shape. *R* for seed surface and *P* were inherited independently. *G* and *Y* were linked with *R*.

Sardar Khan, Abdur Rashid Khan & Muhammad Nasir Khan. Some breeding investigations on gram (Cicer arietinum *L.) in the Punjab. Inheritance of some plants and seed character. (pp. 11–12).*

Pink and white flowers segregate according to a 3 : 1 ratio. Compound leaf is monogenically determined and is dominant to simple. Seed surface depends upon a single gene pair, rough surface being dominant to smooth. Three pairs, *Dd*, *Gg* and *Yy*, are involved in brown seed colour. The seeds are dark brown in genotypes homozygous for *D*, and heterozygous or homozygous for *G* and *Y*. Mottled seeds are produced by the genotype *Dd Gg Yy*. With genotypes heterozygous for *D* and homozygous or heterozygous for *G* and *Y*, light brown seeds are obtained. Yellow seeds are associated with *gg* combined with *D* and *Y* in the homozygous or heterozygous condition. Plants possessing one only of the genes *D*, *Y* and *G* in the heterozygous form in an otherwise recessive genotype, or all recessives, bear creamy white seed.

Sardar Khan & Abdur Rashid Khan. Evolution of blight and drought resistant varieties of gram (Cicer arietinum) *in the Punjab. (pp. 12–13).*

Hybrid selections resistant to blight, wilt and drought and with high yielding ability have been developed. Selections C 334/1, C 392/1 and C 612 are particularly promising, out-yielding the standard variety C 1234 by 8 to 49%.

Sardar Khan, Abdur Rashid Khan & Muhammad Aslam. C 141—a new barley variety for the Punjab. (p. 13).

The new hybrid C 141 has given 22·2% higher yield on the average than the standard in trials for two years; it has good malting and brewing quality.

Sardar Khan & Abdur Rashid Khan. Punjab wheats and their important characteristics. (p. 13).

Of the five wheats discussed, C 228 provides flour with the best properties for bread making.

Abdul Hameed Khan & Muhammad Afzal. Vicinism in cotton. (pp. 13–14).

See *PBA*, Vol. XXI, Abst. 2835.

Abdul Hameed Khan. Variations in the F_2 Mendelian ratios, with the age of the F_1 in two characters of the cotton plants. (p. 14).

Seasonal influences did not cause significant

deviations in Mendelian ratios (cf. *PBA*, Vol. XXIII, Abst. 2824).

Abdus Sattar & Abdul Hafiz. Some further studies on gram blight control measures—disease resistant varieties. (*pp. 28–29*).

The introductions 4732, 199 and 281 showed considerable resistance to blight in tests at Lyallpur. They have been renamed F 8, F 9 and F 10, respectively. The resistant strain C 12–34 has been developed from F 8 x Pb 7. A number of blight-resistant hybrids are now being studied with respect to yield and resistance to wilt.

924 **Proceedings of the Third Pakistan Science Conference, Dacca, 1951** : Pp. 105.

Agriculture: animal husbandry and forestry

Abdus Sattar & Abdul Hafiz. A practical method of inoculating gram crop with gram-blight fungus on a field scale. (*pp. 1–2*).

In the course of investigations concerned with developing chickpea varieties resistant to blight (*Ascochyta rabiei*) at the Agricultural College, Lyallpur, it was found that inoculation on a field scale could be accomplished by broadcasting diseased portions of plants.

Alim, A. Deterioration of crop plants. (*p. 6*).

Genetic and other causes of deterioration of improved strains are briefly considered.

Tarikullah & Alim, A. Five years' test of Aman hybrids. (*p. 6*).

Hybrids of winter rice produced at Dacca Farm, East Pakistan, have outyielded their parents, which consisted of improved selections. Transgressive segregation is thought to be the possible cause of the superiority of the hybrids.

Hasanain, S. Z. & Obaidur Rahman. A Cercospora *leafspot of* Spinacia oleracea. (*pp. 7–8*).

The abstract mentions the considerable resistance to *C. beticola* shown by the indigenous but noncommercial type of spinach, khara palak, in the Karachi district. Crosses between this type and susceptible commercial varieties are being studied in the hope of developing resistant forms.

Chaudhuri, S. D. & Sen, J. L. Correlation of quantitative characters in paddy. (*p. 23*).

Thirteen pairs of correlated characters are listed.

Naqi, S. A. & Hasan Ahmad. Gluten contents of Punjab wheats. (*p. 25*).

Experiments on six commercial varieties at Lahore have indicated that the rotor method of determining gluten content is satisfactory.

Biology: zoology, botany, entomology

Ikram Ilahi Chaudhri. A note on the vegetation of Chitral State. (*p. 39*).

Chitral State is regarded as an important centre of origin of cultivated plants, because of the presence of a large number of dominant characters in the indigenous varieties.

Ikram Ilahi Chaudhri & Hussain, A. The effect of stem rust on the nitrogen-content of wheat grain. (*pp. 39–40*).

In most of the 30 varieties studied, stem rust infection was associated with increased N content and reduced 100 grain weight.

925 **Proceedings of the Fourth Pakistan Science Conference, Peshawar, 1952**: Pp. 160.

Agriculture: animal husbandry and forestry.

Syed Mohammad Ibrahim Shah & Ghulam Mehboob, M. Commercial importance of hybrid vigour in maize. (*pp. 4–5*).

Twelve F_1 hybrids involving the varieties Pride of Saline, Oklahoma, Peshawar White and Swabi White were studied at Tarnab Agricultural Research Station, North-West Frontier Province. The majority exhibited increases in yield and the morphological characters measured, compared with the parents having the higher values. Commercial cultivation of Swabi White x Okla. would increase yield by 33%.

Desai, B. B., Sind, A. R. S. & Siddiq Khan, S. M. Research work on wheats in Sind. (*p. 13*).

Bred at the Agricultural Research Station, Sakrand, the hard wheat H 68 (HSW III x IP 120) has outyielded the standard, C 591. The variety is now being extensively tested in Sind; it has strong straw and some resistance to rust.

Mithaiwala, I. K. Sesamum (Sesamum orientale *Linn.*), *an important oil seed of Pakistan.* (*pp. 13–14*).

A promising new strain, Jamesabad–33, has been selected in Sind. It has outyielded the standard, Cawnpore–S–6, and shown a higher degree of resistance to phyllody.

Ahmad, G. D., Hafiz, A. & Ashraf, M. Some studies on the inheritance of blight resistance. (*pp. 15–16*).

The resistance of the gram varieties F 8 and

F 10 to *Ascochyta rabiei* (cf. Abst. 923) depends upon two dominant linked genes, R_1 and R_2.

Alim, A. & Sen, J. L. Linkage of characters observed in a boro *(spring paddy) cross.* (*p. 16*).

In the F_2 cross between the spring rice B 70–107–17 and the summer rice As. 24–1, studied at the Deep Water Paddy Research Station, Habiganj, E. Pak., the following characters were associated: purple apiculus and purple glumes; green apiculus and white glumes; purple apiculus and purple awn; green apiculus and white awn; and purple glumes and purple awn.

Ahmad, G. D., Hafiz A. & Ashraf, M. Cytological studies on some indigenous and exotic gram types. (*pp. 16–17*).

The blight resistant types F 8 and F 10 of *Cicer arietinum* and susceptible local varieties Pb 7 and C 7 were found to have chromosome numbers of $n = 8$ and $2n = 16$.

Ahmad, G. D., Hafiz, A. & Ashraf, M. Association of morphological characters with blight reaction. (*pp. 16–17*).

Blight resistance in the gram types F 8 and F 10 is strongly associated with hair density, weakly but positively associated with plant height, and negatively associated with number of tertiary branches.

Abdus Sattar, Hafiz, A. & Muhammad Amin. Control of sugarcane smut by resistant varieties and cultural methods. (*p. 24*).

Sugar cane varieties are classified according to their reaction to smut at Lyallpur.

Abdul Hameed Khan & Stroman, G. N. Breeding of cotton varieties resistant to bacterial blight. (*pp. 26–28*).

A general survey is given of breeding for resistance to *Xanthomonas malvacearum* in different countries.

Abdul Hameed Khan & Stroman, G. N. Breeding of cotton varieties for strength of fibre. (*pp. 28–30*).

Investigations in the United States form the main subject of this brief survey.

Abdul Hameed Khan & Muhammad Afzal. Breeding of high ginning varieties of American cotton in the Punjab. (*pp. 30–31*).

In the most recent breeding, crosses between Punjab American varieties and introduced types have yielded selections with 37·0 and 42·0% ginning outturn. Among the introduced cottons, D and PL, an Upland American variety with a ginning outturn of 40–42%, has proved particularly valuable as a parent.

Muhammad Abdullah Khan. Subsidiary factors for prediction of yield in small grains. (*pp. 33–34*).

In experiments on grasses and small grains at College Station, Tex., forage yield was positively and significantly correlated with culm height, dry weight of plants in weekly samplings and with root weight. Dry weight was positively and significantly correlated with root weight and tiller number.

Abdul Hameed Khan & Stroman, G. N. Breeding of cotton varieties resistant to Verticillium *wilt.* (*pp. 35–36*).

Work in the United States is described.

Abdul Hameed Khan & Stroman, G. N. Breeding of cotton varieties resistant to Fusarium *wilt* (Fusarium vasinfectum *Atk*). (*pp. 37–38*).

Breeding in the south-eastern region of the United States is reviewed.

Kausar, A. G. Variation in Gnomonia *sp., from strawberries.* (*pp. 39–40*).

Isolates of *Gnomonia* sp. from wild strawberry comprised at least six races differing in one or more of the following characters: cultural properties on artificial media, nutritional requirements, reactions to temperature, pH requirements and sporulating ability.

Kausar, A. G. Studies on the variation in Dendrophoma obscurans *(Ellis and Everhart) Anderson.* (*pp. 40–41*).

Isolates from strawberries consisted of 15 races distinguished by their cultural characters on artificial media, pH requirements, response to temperature and nutritional requirements.

Ishaque, M. & Badruddoja, M. Variation in the pathogenicity of two isolates of Colletotrichum falcatum *Went.* (*p. 42*).

Two isolates from East Bengal differed in pathogenicity upon 27 sugar cane varieties.

926 AGERBERG, L. S.
Report to the government of Afghanistan on seed improvement.
Rep. FAO UN, Rome 1953 : No. 147 : Pp. 14. (Mimeographed).

Work in connexion with the classification of Afghan wheats is already in progress at Aliahbad and Gozergah.

The recommendations put forward include the following: establishment of a central breeding station near Kabul, and of substations for the trial of improved types; and the production

and distribution of improved seed. The most promising wheat material available for selection is considered to be *Triticum vulgare* vars. *albidum* and *milturum*.

927 Rapport du Conseil de l'Expérimentation et des Recherches Agronomiques pour 1951–1952. (**Report of the Council of Agronomic Experimentation and Research for 1951-52**).
Alger 1952 : Pp. 288.

In addition to trials of varieties of rice, lucerne, lupin, vetch, meadow grasses, potatoes, sugar beet, sweet sorghum, tomatoes and peas, introduced from other countries, the following work was carried out at various research stations in Algeria:—

Wheat. At the Central Station of the Agricultural Institute of Algeria, the early variety Syndiouk-Mahmoudi from Tunis ranked first with 30 q. per ha. and Hedba 3 did best among the Algerian-bred hard wheats owing to its resistance to drought and to the hot wind in May. Zénati x Bouteille 13.953, which is susceptible to lodging, produced 94 tillers as compared with the 200 recorded for Hedba 3; it also yielded less than Syndiouk x Mahmoudi, which it however surpassed in 1000 corn weight and in freedom from mealy endosperm, though the grain is not attractive in appearance.

Trials at the Guelma Breeding Station confirmed last year's results in which (1) H. 42 (Syndiouk x Mahmoudi) x (Zénati x Bouteille) outyielded Zénati-Bouteille; and (2) the Kalèche hybrids proved more resistant to lodging.

The freedom of Zénati 368 and 7.687 from mealy endosperm, in contrast to Mekki, Adjini and Langlois, was confirmed.

In the search for physiological lines free from mealy endosperm, 131 selections of the varieties Tlemcan, Tessalah, Zénati x Bouteille 13.953, Langlois 1.527, Md Ben Bachir 8.037 and Hedba 3 ultimately yielded 6 lines with no trace of the defect.

Breeding for earliness continues and hybrid lines of Oued Zénati x Bouteille and Bouteille x Hedba ripened about 25–30 days before the control Zénati x Bouteille 13.953. The best lines of Bouteille x Hedba are subject to lodging, also a defect of line H 42–92 of (Syndiouk x Mahmoudi) x (Zénati x Bouteille), which has been retained as a likely source of transgressive segregates for earliness.

Other early, crossbred material being studied includes; (*a*) two progenies of Palestine 423 and one line of Palestine J5; (*b*) the Leroy hybrids, whose performance as regards yield and lodging is tabulated; (*c*) the crosses Zénati 368 x Chili [Chile], Chili x Hedba and Zénati 368 x Bachir, made in order to combine the cultural qualities of Zénati 368 with the grain quality of Hedba, Bachir or Chili; and (*d*) two strains 17.110 and 20.766, which approximate to the control in yield and will be compared with Chili, 931, received from the Botanical Service, Tunis.

The vegetative features of wheats from Versailles, Irak, Syria and Morocco were observed and a botanical study will follow.

As regards the soft wheats, the breeding material under observation includes some Tuzelle wheats and Tuzelle crosses; hybrids of *Aegilops triunciales* x Langlois 1.527 PL; various Mahon wheats and Mahon hybrids; and lines of Pusa x Mentana.

Hybrid progenies of Australian and other wheats are to provide material for rust resistance in soft wheats.

Oats. At the Central Station oat yields have been lower than last year, but Cowra regained first place and showed a high kernel percentage. Palestine, which was earlier than Cowra, is susceptible to rust.

Lines of Cowra x 912, local varieties and 42 different types of oats from Versailles, Montpellier, Rabat and Tunis are being studied.

Maize. In variety trials of earliness and yield, American hybrids proved superior under irrigated cultivation.

Barley. Among the barleys that yielded 25 q. or more per ha. were the Tichedrett lines; US 43; and the lines 839, 48 and 183. The performance of the late varieties New Mexico and Palestine M 38 was inferior to that of the previous year.

Line selections from US 43 x Colmar and Moravie [Moravia] x 48 are being tested as malting barleys.

Cotton. The 44 wild and cultivated species and varieties in the collection at the Central Station of the Algerian Agricultural Institute now cover all the known species of races except four. *Gossypium somalense* and *G. thurberi* may be of value as parents in crosses, the former being resistant to certain pests, and the latter likely to improve the tensile strength of the fibre of commercial varieties. The collection of American cottons now numbers 27.

The preliminary choice of initial material is in progress, with a view to (1) mass pedigree selection of the type applied by Harland to Tangüis cotton (cf. *PBA*, Vol. XX, Abst. 681) and (2) genealogical selection.

Crosses have been made between the varieties Rowden 41 B x Acala 4–42 and between the

species *G. hirsutum* (Rowden 41 B) and *G. barbadense* (Zagora).

Tobacco. Breeding and other research are carried out at the Isserville and Bône Bou Hamra Stations.

At Isserville a collection of varieties of *Nicotiana rustica, N. petunioides* and *N. tabacum* as well as of intervarietal and interspecific hybrids has been formed.

Selection of mother plants and lines of native and other types of tobacco is in progress and trials of varieties introduced from other countries, including oriental, Swiss, French and American varieties, are being conducted.

Vine. Systematic research on vines, begun in 1950, included investigations by the Viticultural Laboratory of the Agricultural Institute of Algeria on the calcium tolerance of stocks; clonal selection of varieties for dessert grapes and for wine making; and the compatibility of certain hybrid producers with various stocks.

Beans. In addition to selection work and comparative trials of various lines, a study of morphological and phenological characteristics and of the inheritance of seed colour and earliness has been undertaken. Four species of *Phaseolus* comprising 47 varieties were represented in yield trials. Some varieties of *Ph. vulgaris* with coloured seeds seem more resistant to rotting in the soil at germination than the white-seeded types.

Cicer. Material undergoing selection includes 146 lines and varieties.

Lentils. Selection is in progress. In comparative trials of 34 lines, the highest yield was obtained from the small green lentil 282.

Resistance to bruchid attack seems greater in strains long cultivated in Algeria than in recent introductions, e.g. Chili [Chile], which showed a loss of 22% from that cause.

Progress is being made with the breeding of a high-yielding green lentil with larger seeds than du Puy, and the selection Tiaret 64 is being multiplied.

928 **Annual Report of the Department of Agriculture, Sierra Leone for 1952** : Pp. 68. (Mimeographed).

Rice. The erection of the West African Regional Rice Research Station at Rokupr progressed ahead of schedule. Breeding experiments carried out in 1950 were successful and the hybrids obtained are being multiplied for selection. Further varieties were imported and selections from existing stocks continued. Trials at Kasanko indicated that Toma 112 was the variety best suited to shallow flooded areas. Ngasein gave the highest yields in trials held at the Makeni Experimental Farm.

Tobacco. Of five varieties planted at the Makeni Experimental Farm, Jamaican Hybrid and Western Heavy gave the best results.

Oil palm. It is intended to establish an oil palm research substation in Sierra Leone. A suitable site remains to be selected.

929 **Annual Report of the Department of Agriculture, Gold Coast, for the year 1951-52** (1953) : Pp. 25.

Maize. The South African variety Tsolo showed some resistance to rust; incorporation of this resistance into locally acceptable varieties is being attempted. An interterritorial organization for investigations on rust, including breeding for resistance, is to be established, with its headquarters at Ibadan, Nigeria.

Sorghum and millet. Sorghum breeding has been initiated to develop shorter strawed varieties of the local type, and a sorghum which is midge resistant because its glumes do not open at anthesis or because it is late flowering (cf. Abst. 344).

Selfing of early-maturing local varieties of millet has resulted in the identification of two types; one with white seeds, large heads and few tillers, and the other with grey seeds, smaller and tightly packed heads, short straw and good tillering capacity. The production of synthetics from each of these types and from their combination is to be undertaken.

Other crops. In trials of local and introduced varieties of rice at Nyankpala, the best entries gave over 3000 lb. paddy per acre. Groundnut variety tests were carried out at Tamale.

930* Rapport annuel pour l'exercice 1951. (**Annual report for the financial year 1951**).
Publ. Inst. nat. agron. Congo belge 1952 : Hors Sér. : Pp. 436.

The following crops are dealt with in this report (cf. Abst. 147) issued by the National Institute for Agronomic Study in the Belgian Congo:—

Pyrethrum. Colchicine-treated breeding material includes two seedlings, D_1 Co 25 and D_1 Co 53, whose pyrethrin content attained 1·70% and 1·76% respectively. Hybridization was carried out with the following aims: (1) increase of pyrethrin content by crossing clones

* An extended summary of this paper is on file at the Bureau.

with a high content of pyrethrin I and others with a high content of pyrethrin II; (2) increased vigour and yield, and earlier bearing in valuable but very late clones; and (3) the introduction of new gene material.

Other problems under investigation are: the effect of environment on yield of pyrethrins; the several characteristics that contribute to resistance to *Ramularia*; and the correlation between content of pyrethrins in the inflorescences and in the seeds derived from them.

Wheat. At the Kisozi Station, the improvement of baking value involves studies of the 1200 varieties of the station collection and of the lines from crosses made in 1944, 1948 and 1949.

Maize. At the Nioka Experimental Station, breeding for yield and earliness is being continued.

At the Yangambi Research Centre, about 50 varieties were introduced from the USA, Argentina, Peru, Tanganyika, Morocco, French Equatorial Africa and the Belgian Congo; and about 20 of these were crossed with purified Turumbu maize.

At the Gandajika Station, research has included: selection and selfing to purify lines of the natural hybrid Flat and of the (Gandajika x Hickory King Nioka) x 4GPS I cross; backcrossing of breeding lines to fix the uniform arrangement of the rows in the ear, characteristic of Hickory King and Pride of Saline; the production of simple, double and multiple hybrids; crossing with Chiemgau to shorten the vegetative cycle of various lines; observation of foreign varieties introduced in 1951; variety trials; and the study of the inheritance of elongation of the sheath.

Millet. At the Kiyaka Station, mass selection of *Pennisetum typhoides* is in progress, as well as pedigree selection of 60 lines and comparative trials of five local varieties from Kiyaka and other regions.

Comparative trials and selection of local varieties of *Eleusine* are proceeding at the Kisozi Station.

Sorghum. At the Mulungu regional laboratory, four varieties are being compared as regards resistance to *Calandra oryzae*.

Rice. At the Yangambi Research Centre, introductions from the USA, Brazil, Peru, India, Indochina, Madagascar, the Ivory Coast and Chad numbered 85.

The technique of crossing is being investigated. Selection is proceeding on the basis of grain shape and vitreousness.

Cotton. At the Lubarica Station the selection of hybrid material from numerous crosses and back crosses is still in progress. In the F_4 of crosses of Upland by wild cottons, the line Barbagar (*Gossypium barbadense* x Gar) consists of vigorous, healthy and very hairy plants with excellent characteristics as regards fibre.

At the Bambesa Station, selection for lint length and yield of seed is being carried out.

Three new crosses were made: Stoneville 2/180 x Gar 105/122, Stoneville 26 x Ishan and Stoneville 5 x Ishan.

Stoneville x DPL 11/A/1 has proved much more wilt resistant than the control Stoneville 0/4.

Cassava. At the Gandajika Station, selection work and comparative trials of varieties are being carried out.

In a preliminary trial of 81 varieties planted in 1948, the two best clones, Kambayi and São Pedro, yielded respectively 52,800 and 46,000 kg. of fresh roots per ha.

Tea. At the Mulungu-Tshibinda Station, mother trees have been classified according to the frame and plucking surface of the bush, number and quality of shoots, shape of leaf and size of internodes, and the final choice will be based on yield.

Coffee. At the Mulungu-Tshibinda Experimental Station, new progenies of *Coffea eugenioides*, *C. arabica* var. *semperflorescens* and var. *moka* have been added to the collection.

Reselection of mother trees and the choice of mother trees of varieties new to the Station are proceeding, as well as progeny trials of intraspecific and interspecific hybrids.

Promising results have been obtained in the search for species and varieties resistant to *Antestia*.

Cacao. The Yangambi Research Centre is conducting investigations on the biology and adaptation of *Cacao* to the Belgian Congo.

Theobroma microcarpa has been introduced from Brazil.

A collection has been established of offspring from Criollo type trees with large beans and white cotyledons.

Oil plants. At Rubona the castor oil plant variety, Ruanda Amahyza, yielded 2279 kg. of seed per ha, with a content of 43% of oil and a refractive index of 1.4799.

Selection of *Aleurites*, sunflower and oil palm is also in progress at various stations.

The study of the *albescens* character in oil palm is nearing completion. Pollination of 91 trees of the *albo-nigrescens* and *albo-virescens* varieties was effected.

A survey in the Mayumbe district resulted in the discovery of 525 palms of the *albescens* type, including the three varietal combinations:

albonigrescens dura, albo-nigrescens tenera and *albovirescens dura.*
Selection of *tenera* and *dura* mother trees is being carried out by several commercial firms in the Belgian Congo and an acclimatization experiment has been laid out.

Cinchona. At the Mulungu-Tshibinda Station, parent material of *C. ledgeriana* will be chosen on the basis of vigour, alkaloid content, and any insect resistance exhibited.
Selection is also being carried out on (*a*) out-pollinated progenies planted during 1939–45, and (*b*) F_1 hybrids laid down in 1945 as a future source of possible mother trees and as an indication of the relative value of various parent combinations.
Other subjects under investigation are floral characteristics and fructification and variation in quinine content according to age and other factors.
The growth increments of seedlings of *C. ledgeriana, C. josephiana, C. succirubra* and a *Cinchona* hybrid from Dendezi are being recorded at the Rubona Station.

Hevea. The Yangambi Research Centre is investigating the latex coagulation of various clones, in addition to experiments on pre-selection and studies of (1) combined plots of *H. brasiliensis* with *H. collina* and with *H. spruceana* and (2) the correlation between the Morris-Mann tests and the actual productivity.
A study of twin plants has been undertaken in conjunction with research on the effect of the stock on the scion.
In the clone plantations, M 8 and Av 49 showed little brown bast and M 1 and Tj 16 exhibited good resistance to wind damage.

Mulberry. At the Mont Hawa Sericultural Research Centre, preliminary varietal studies based on leaf production have been begun, as well as trials of clones.

Groundnut. Selection is proceeding for earliness, seed weight and yield at the Bambesa Experimental Station.
At Yangambi, observations on the varieties A 20 and A 65 showed that germination capacity was higher in seeds of medium weight, and of the seeds in the same pod those nearest the gynophore germinated best. Mortality of the seedlings, which reaches its maximum in the third week after germination, increased in direct proportion to seed weight. Natural crossing between A 20 and A 65 was investigated.
Line selection in progenies from controlled and natural crosses was carried out.

Soya bean. Selection among the progeny of artificial crosses has reached the stage of comparative trials.

931 SOYER, L.
L'activité de l'Inéac dans les territoires du Ruanda-Urundi en 1952. (**The work of Inéac in the Ruanda-Urundi territories in 1952**).
Bull. INEAC 1953 : **11** : 209–41.

This article includes some brief notes on the work of the National Institute for Agronomic Research in the Belgian Congo (INEAC) on selection, carried out at various regional research stations, to improve the quality and yield of cereals, legumes, sweet potatoes, cassava, oil-bearing plants, bananas and plantation crops.

932 **Annual Report of the Department of Agriculture, Colony of Mauritius, for the year 1952** : Pp. 62. (Mimeographed).

Maize. The variety New Zealand gave the highest yield in maize variety trials.

Potato. A high incidence of leaf roll was observed. King George was the only variety showing immunity.

Sweet potato. No. 27 gave the highest yields in variety trials.

Sugar cane. The varieties R 366, R 397, Pindar, Trojan, POJ 3016, B 41227, H 32–8560, H 37–1933 and Eros were introduced, and are being grown under quarantine.

Tobacco. The progeny of earlier individual selections of Amarello, the variety most widely grown in Mauritius, showed considerable difference in yield and value of leaf. One line is particularly promising.
Among the flue-cured Virginian varieties under trial, Yellow Special from India and Jamaica Wrapper from Canada compared favourably with the established varieties.
Successful crosses were effected to improve resistance to black shank.

Tomato. Of winter-planted varieties, Reine des Hâtives [Queen of the Earlies] and Cerise [Cherry] gave the highest yields.

Beans. Golden Queen and Mange Tout [Eat All] gave the highest yields.

933 **The National Research Council Review 1953.** Ottawa : Pp. 244.
Associate Committee on Plant Breeding. (*pp. 191–95*).

University of Alberta

Wheat. Cytogenetical analysis of *Triticum* by means of nullisomics and monosomics, and investigations on cytogenetical response to herbicides and insecticides continued (cf. *PBA,*

Vol. XXIII, Abst. 1801). Substitutions of different Thatcher chromosomes for chromosomes of Chinese Spring had marked effects on agronomic characters.

Barley. Further work was carried out on the identification of genes for loose smut resistance.

Lucerne. Cytogenetical studies have been initiated.

University of Manitoba

Forage species. An extensive cytotaxonomical study of the flora of Manitoba is in progress, particular attention being given to forage and pasture species.

University of Saskatchewan

Wheat. Further work was carried out on the development of an aneuploid series of *T. durum.* The project of substituting chromosomes of rye for chromosomes of winter wheat continued (cf. *PBA*, Vol. XXIII, Abst. 1801). A complete series of wheat crosses between Kharkov and aneuploids of Chinese Spring was effected.

Barley. Nondetrimental mutants obtained by irradiation gave promising results in field tests. Development of amphidiploids and tetraploids is in progress.

934 **Report for 1949 and 1950 of the Ontario Horticultural Experiment Station** : Pp. 70.

Sweet pepper. The variety Vinedale has been developed (cf. *PBA*, Vol. XXI, Abst. 2069).

Peach. Considerable varietal differences in the degree of drop are described.

In addition to Erlyvee and Vesper (cf. *PBA*, Vol. XX, Abst. 660), Somervee (Halehaven x Oriole) has also been introduced. Somervee is an early ripening, yellow-fleshed, clingstone type with good quality.

Apple. A detailed survey is given of breeding from 1915 to 1950.

Nuts. Breeding of filberts and Persian walnuts is in progress.

Radish. Breeding has been initiated to develop self-compatible and otherwise improved varieties of the Scarlet Globe type for greenhouse cultivation.

Asparagus. V–35 has been named Viking (cf. Abst. 153).

Tomato. The genetics of resistance to leaf mould (*Cladosporium fulvum*) is being investigated. Work has begun on the transference of the factor for anatomical male sterility to the parents of promising F_1 hybrids. Breeding for high content of ascorbic acid, using wild species, is receiving attention.

Vulcan (V–4804), from V–473 x Vetomold, is immune from races 1, 2 and 9 of leaf mould and highly resistant to races 5 and 7. Races 6 and 8, to which this new variety is susceptible, occur rarely. Vulcan is recommended for greenhouse planting in the autumn only.

935 **Report of the Department of Agriculture, Forestry and Fisheries, St. Vincent, for the year ended 31st December, 1952** : Pp. 40. (Mimeographed).

Maize. Hybrid breeding has been curtailed in view of the relative unimportance of maize as a commercial crop in St. Vincent; a satisfactory experimental hybrid has however been developed. Mass selection is now being carried out to produce improved seed stocks for farmers.

Cotton. Breeding continued (cf. *PBÅ*, Vol. XXIII, Abst. 2817).

936 **Administration Report of the Director of Agriculture, Trinidad and Tobago, for the year 1952** : Pp. 54. (Mimeographed).

Sugar cane. In variety trials in Trinidad, B 41227 continued to give good yields, but its juice quality was not superior to that of B 3337.

Cacao. Clonal trials continued. In breeding for resistance to witches' broom at the Marper Station, immune types have been crossed with high yielding ICS and South American clones; the hybrids are now in their third year. In addition, seedlings which have remained free from witches' broom infection have been selected.

Other crops. Selection of rice and pigeon pea is in progress.

937 **Investigations 1952.**
Bull. Dep. Agric. Jamaica 1952 : No. 50 : Pp. 122.

Banana. At the Banana Breeding Station, Bodles, work is concentrated on crosses between Pisang Lilan as male and 1071 (10), a diploid hybrid bred at the Imperial College of Tropical Agriculture, Trinidad. Tests of new seedling varieties continued. In shipment trials, all the seedlings used were as good as Lacatan under comparable conditions.

Other crops. Selection of cashew nut and coffee continued. Variety trials were carried out on cereals, root crops, cacao, oil palm and several other crops.

938 **Report of the administrator of agricultural research.**
US Dep. Agric., Agric. Res. Admin. Wash. 1952 : Pp. 484.

The report of the Bureau of Plant Industry, Soils and Agricultural Engineering is included,

providing a survey of the new varieties recently developed and other achievements in field and horticultural crop breeding. Most of the numerous items mentioned have already been referred to in *Plant Breeding Abstracts.*

939 **Annual Report of the University of Florida Agricultural Experiment Stations, for the fiscal year ending June 30, 1952** : Pp. 310.

The results of variety trials of cantaloupe, peach, blueberry, dewberry, tung, tomato, cucumber, broccoli, pepper, egg plant, onion, water melon, and several other fruits and vegetables are presented. Details of breeding experiments with peas, beans, tung and sugar cane are also given.

Oats. Several hybrids of Landhafer, in particular CI 6588, a selection from Florida 167 x Landhafer, have proved highly resistant to the races of crown rust now prevalent in Florida. Crosses have been made to incorporate resistance to *Helminthosporium*, stem rust and crown rust into oat varieties suited to Florida. Some 120 F_2 lines combining resistance to at least three major diseases were selected.

Maize. Dixie 18 and Georgia 281 gave the highest yields in variety tests conducted in 1951. The development of new inbred lines was continued, together with a programme of backcrossing to incorporate the factor for cytoplasmic male sterility and factors for restoring fertility in the more important inbred lines. It is hoped that the need for detasseling the male parent in seed production fields can be eliminated by the use of male sterility.

Bahia grass. Five lines that are either self sterile or male sterile, and include both broad-leaved and narrow-leaved types, are being crossed with Argentine and Pensacola Bahia grass in an attempt to combine in a self-sterile line the vigour of the Argentine type with the cold resistance and earliness of Pensacola. It is thought that a strain that does not set seed will produce a higher yield and a more succulent forage.

Vetch. At Gainesville, a Texas selection of common vetch and the variety Oregon Woolypod were superior in yield trials. At the Suwannee Valley station, Monantha vetch outyielded all other varieties tested.

Lupin. The critical level for X-irradiating blue lupin seeds was found to be around 20,000 r. In yield trials at Gainesville, yellow-flowered varieties were found to give a higher yield than blue-flowered varieties.

Potato. Of six varieties of potato tested, Sebago proved superior in yield and quality.

Tobacco. Seven varieties, 400, 402, Hicks, Bottom Special, Yellow Special, Gold Dollar and Dixie Bright 101, together with all possible combinations of crosses between them, were grown in 1951 to determine whether heterosis existed in such progeny. No hybrid progeny was superior to Bottom Special, which gave the highest yield per acre. Results indicate that no over-dominance for yield and quality genes exists in these seven varieties, and that heterosis is unimportant in crosses involving these varieties.

Groundnut. Florida 334 A, Early Runner and Dixie Runner gave above average yields in variety tests. Florida 334 A, a new strain, is a cross between Spanish-Dixie Giant and Georgie 207–3. It has medium-large seed of the Spanish type and a runner plant habit.

Cabbage. Glory of Enkhuizen, Early Glory and Bonanza significantly outyielded four other midseason varieties and seven early varieties. Medium Copenhagen, Resistant, Resistant Glory, Marion Market and Wisconsin 2135 P proved resistant to *Fusarium oxysporum* f. *conglutinans.*

Cowpea. A large number of American and foreign varieties were tested. The most promising were Calhoun Crowder, Beltsville 53 and 67 (both derived from Chinese Red x Iron), Paraguay 1, Chinese Red and Blue Goose.

Soya bean. Trials showed Clemson 1507 to be the highest yielding variety.

940 **64th Annual Report of the Mississippi Agricultural Experiment Station, for the fiscal year ending June 30, 1951** : Pp. 89.

The results of cereal, fruit and vegetable trials, conducted by the Mississippi Agricultural Experiment Station and its substations, are given.

Wheat. Atlas 66 and Chancellor proved to be the best adapted wheat varieties for the Delta area. Both varieties combine high yield with stiff straw and resistance to leaf rust and frost.

Oats. Mustang, a new variety developed by the Texas Agricultural Experiment Station (cf. *PBA*, Vol. XXI, Abst. 1791), has given good yields and is resistant to lodging and frost. Delta Red 88, Madison County, Camellia, Delair and Nortex 107 are the leading varieties for green forage. For grazing purposes, Texas Red Rustproof strains and varieties are the most suitable.

Maize. The new hybrid selections Dixie 11, 17, 18, 22, 33 and Funk G714A gave the highest yields.

Sorghum. Among grain sorghums, Dwarf Yellow, Dwarf White and Regular Hegari gave the highest yields.

In trials of sorghum for syrup production, the varieties Sart, Hodo and White African gave the best results.

Sweet potato. Georgia Bunch was the highest yielder among eleven varieties tested. Allgold and Goldrush show most resistance to stem rot.

Cotton. In a wide series of trials the varieties Deltapine 15, Empire, Stoneville 2B, Delfos 9169, Coker 100 Wilt and Coker 100 Staple proved the best yielders.

Sugarcane. In variety trials, CP 36/111 and CP 29/116 gave the highest yields. The former was highly resistant to mosaic.

Pepper. Of 10 varieties and 7 lines tested, Oakview Wonder and Early Calwonder led in early production of marketable peppers.

Tung. The varieties La Crosse, Cooter, Lamont and Isabel have yielded well.

Apple. The most outstanding varieties were: Early Harvest, Melba, Williams Early Red, Kosciusko, Macoun, Golden Delicious and Roxbury Russet.

Strawberry. Massey has proven to be one of the leading varieties and is recommended for cultivation in Mississippi.

Grapes. Fourteen varieties of muscadines were tested. The pollinator varieties Wallace and Burgaw were the most outstanding.

Cabbage. Copenhagen Market and Resistant Detroit produced the highest yields.

Lettuce. The varieties A–36, Great Lakes 407 and Early Great Lakes were the best yielders.

Cucumber. Crossing, selecting and selfing in selected lines were continued in 1951 to improve Magnolia, and particularly to introduce into this variety some resistance to downy mildew.

Tomato. Lakeland, Urbana, Rutgers and Improved Pearson were the highest yielding varieties.

Beans. Contender and Topcrop were outstanding among green beans.

Lima beans. The varieties Henderson's Bush and Early Thorogreen gave the highest yields of good quality beans. Attempts are being made to combine the hardiness and yielding qualities of the Jackson Wonder variety with the eating and processing qualities of other varieties.

Soya beans. Hale Ogden, Ogden, Roanoke, Dortchsoy 31 and N 45–3728 gave the highest yields.

Pea. The new Dixielee pea has given high yields on nematode-infested soil.

In variety trials of English peas, line 632 and Dark Skin Perfection yielded best.

Sweet corn. The varieties Huron and Oto gave the highest yields.

941 **65th Annual Report of the Mississippi Agricultureal Experiment Station, for the fiscal year ending June 30, 1952** : Pp. 91.

Oats. Arlington, Delair, Victorgrain, Mustang and Madison County gave the highest yields in variety trials.

The new Coker strains 51–57, 51–1 and 51–2 are extremely promising.

Rye. A strain of Abruzzi rye was found which had high yield combined with exceptional resistance to cold and leaf rust.

Maize. A new experimental hybrid, Miss. 1123, yielded well and lodged much less than Dixie 17. If it proves satisfactory in large-scale field tests it will be released in the near future.

Dixie 11, 17, 18, 22 and 33 gave the highest yields in trials.

Barley. A new early variety, Kenbar, (cf. *PBA*, Vol. XXIII, Abst. 1183), gives high yields and has shown good resistance to several important diseases.

Sorghum. Of varieties for syrup production, SA 169 and Sart gave the highest yields.

Sweet potato. In variety trials Allgold and Goldrust yielded best.

Cotton. The highest yielding varieties were Deltapine 14 and 15, Empire, Fox, Stoneville 2B and Delfos 9169.

Gossypium barbadense and *G. arboreum* were more tolerant of *Verticillium* wilt than varieties or strains of *G. hirsutum.*

A new red plant, Ak Djura Red, has been found. It appears to be different from other red stocks and brings the total number of genes governing red plant colour in Upland cotton to four.

Studies of pollen tubes indicate that cotton is slightly cross-incompatible.

Sweet pepper. In variety trials California Wonder, Dixie Wonder and Golden California Wonder gave the highest yields.

Peach. Georgia Belle and Redhaven yielded best in variety trials.

Strawberry. At the Coastal Plain Branch Station, the variety Missionary produced the highest yields over a two-year period.

Cabbage. In variety trials, Green Acre of the early varieties, and Early Glory and Resistant Glory of the midseason varieties, yielded best.

Lettuce. Variety tests have shown that Great Lakes is best adapted to Mississippi conditions.

Cucumber. Extensive breeding work is being carried out to develop a better pickle type.

Tomato. A new high-yielding variety, Kopiah (cf. *PBA*, Vol. XXIII, Abst. 1568) will be released soon.

One of the principal aims in breeding is to develop lines resistant to *Sclerotium rolfsii*.

Snap beans. Crosses were made to transfer the comparative resistance to bean disease of some poor yielding varieties to commercially acceptable strains.

Lima bean. Early Thorogreen, Heretofore, Okla 10 and Clarks Bush gave the highest yields in variety trials.

Soya beans. Ogden, Hale Ogden, Dutch Ogden, Volstate and Roanoke yielded best.

Dorman, a new early maturing variety (cf. *PBA*, Vol. XXIII, Abst. 778) is being increased for distribution by the Delta Branch Station. It yields well and has a high oil content.

Peas. P 39, Laxton's Progress and Little Marvel yielded best in variety trials.

Research work directed at finding resistance to *Ascochyta* blight is in progress.

942 Rusk, H. P.
Research progress at the Illinois Agricultural Experiment Station. Report for July 1, 1950-June 30, 1952 (1953) : Pp. 134.

Oats. Morphological studies were made in 1950 and 1951 on 14 varieties of oats ranging in maturity from early to late. In both years there was a shorter period between planting and panicle initiation in the early than in the late varieties.

Inheritance studies made on crosses between early and late varieties showed that earliness was dominant. Transgressive segregation into types earlier and later than the parents was indicated by the frequency distributions of the F_2 populations.

Maize. Four replications of single-hill plots proved as accurate as seven replications of 10 hill plots for testing double-cross hybrids.

Sorghum. Crosses between *S. halepense* ($n = 20$) and *S. vulgare* ($n = 10$) resulted in hybrids with 30 and 40 chromosomes. Cytological studies showed irregularities in pairing in the 30-chromosome F_1 plants. The chromosome number in the F_2 progeny of F_1 plants with 40 chromosomes ranged from 38 to 40. All qualitative characters showed segregation in the F_2 and backcross progenies, the ratios found indicating that *S. halepense* is an autotetraploid or segmental allotetraploid.

Strawberries. The everbearing varieties Red Rich, Twentieth Century and Zeckcellent, and the June-bearing varieties Armore, Empire, Howard, Robinson, Sparkle, Tennessee Beauty and Vermilion proved superior to other varieties under test.

943 **Abstracts of the Annual Meetings of the American Society of Agronomy, Dallas, Texas 1953** : Pp. 137. (Mimeographed).

Alexander, D. E. Microsporogenesis of maize monoploids. (*p. 78*).

A number of monoploids were isolated in *Zea mays* and a cytological examination of microsporogenesis undertaken. Meiosis was extremely irregular and no clear-cut metaphase I or anaphase I was observed. The first division was reductional. Anaphase bridges were frequent and extensive fragmentation was found to occur prior to, or at the time of, anaphase II. Deficient spores aborted soon after telophase.

Bashaw, E. C. & Fisher, W. D. A case for apomixis in Pennisetum ciliare *and* Cenchrus setigerus. (*p. 79*).

Data are advanced to support the theory that apospory followed by pseudogamy is the usual method of reproduction in these two species.

Battle, W. R. & Pettem, F. D. Seedling selection of alfalfa breeding material. (*p. 79*).

Lucerne seedlings selected for high relative sturdiness were found to retain this superiority throughout their growing period and to give higher yields at harvest. Their progeny were superior to those of the nonselected seedlings.

It is suggested that careful selection of breeding material on the basis of seedling vigour would permit the elimination of many low yielding plants at an early stage in the breeding programme.

Bauman, L. F. Results of further inheritance studies on the Kys type of cytoplasmic male sterility in corn. (*pp. 79–80*).

The writer confirms the views of Schwartz on male sterility in maize (cf. *PBA*, Vol. XXII, Absts. 1878 and 1879). Further studies indicated that plants heterozygous for the suppressor genes $S^{ga}s^{ga}$ can be identified by the fact that 50% of the pollen of such plants is only partially filled with starch. The reason for s^{ga} pollen not being able to compete with S^{ga} pollen is shown to be due to some *s* pollen grains aborting.

Beachell, H. M. Progress of rice breeding in the United States. (*p. 80*).

An account is given of rice breeding in the USA.

Main objectives have been to develop high-yielding varieties suitable for combine harvesting and artificial drying. Progress is being made in developing strains possessing increased resistance to disease and lodging and improved milling and cooking qualities.

Bollich, C. N. Inheritance of length of grain in rice. (*pp. 80–81*).

Rexoro was crossed with an unnamed strain in experiments to determine the genetic factors governing length of grain in rice. In the F_2 generation this character behaved quantitatively, the mean length being equal to the average length of grain of the two parents.

Difference in length between the two parents appears to be governed by only one or two pairs of genes. However, a high degree of transgressive segregation occurred, F_3 lines being obtained with grains considerably longer or shorter than those of either parent, indicating that each parent contributed genes for both long and short grain determination.

Borlaug, N. E. & Gibler, J. W. The use of flexible composite wheat varieties to control the constantly changing stem rust pathogen. (*p. 81*).

It is suggested that physiological changes in the race pattern of *Puccinia graminis* var. *tritici* can be countered by the development of a composite variety formed of a number of different lines, mechanically mixed, each of which presents a different aspect of resistance to the rust pathogen. With changes in races, one or several of the lines in the composite variety can be removed or replaced.

A programme of modified back crossing with commercially acceptable varieties is being undertaken to produce the individual lines required.

Chase, S. S. The monoploid method as applied to the stiff stalk synthetic variety of maize. (*p. 82*).

A number of monoploids were extracted and from these, 83 autodiploid lines were established. Parthenogenetic rates varied with the pollen parent used.

It has been found that the yields of autodiploids from single crosses, double crosses and synthetics of the autodiploids generally exceed that of the original synthetics.

Culp, T. W. & Kinman, M. L. Inheritance and association of oil content and seed coat type in sesame, Sesamum indicum *L.* (*p. 83*).

Seed coat type was found to be a simple Mendelian trait, rough being dominant over smooth. Oil content was inherited as a quantitative characteristic.

Ford, L. A cytogenetic comparison of maize homozygous diploids and inbreds. (*pp. 84–85*).

Cytological studies were made of monoploids and monoploid derivatives in order to examine the meiosis of the monoploids and to determine whether homozygous diploids obtained from them were in fact structurally homozygous.

No cases of structural heterozygosity were found in the monoploid derivatives. No difference was observed between the vigour or fertility of homozygous diploids and inbreds.

Gibler, J. W. & Borlaug, N. E. Wheat breeding programs further complicated by increase in prevalence of races 49 *and 139.* (*pp. 86–87*).

The closely related stem rust races 49 and 139 are on the increase in northern Mexico. Kenya wheat varieties are mostly resistant to race 15B, which thus renders them vulnerable to attack by races 49 and 139, as a strong linkage exists between resistance to 15B and susceptibility to 49 and 139.

Hadley, H. H. A cytogenetic survey of the progeny from a backcross (Sorghum vulgare *x* S. halepense) *x* S. vulgare. (*p. 87*).

A highly sterile 30-chromosome hybrid of *S. halepense* ($2n = 40$) x *S. vulgare* ($2n = 20$) was pollinated by Sweet Sudan grass. Of the F_1 progeny, 43 plants possessed 20 chromosomes, and ranged from complete sterility to a degree of fertility almost as high as that of *S. vulgare*. Varieties with 20 chromosomes and carrying segments of *S. halepense* chromosomes can be obtained by selfing or by back crossing to *S. vulgare*. These lines may be useful in themselves, as for example a perennial Sweet Sudan type, or they may be valuable in a hybrid sorghum breeding programme as parental material for the production of grass hybrids.

Henderson, M. T. Use of recurrent selection in improvement of a predominantly self-fertilized plant—Upland cotton. (*p. 87*).

Data are presented on experiments with recurrent selection as a means of increasing the frequency of superior gene combinations. The material chosen consisted of the F_2 population from a cross between two varieties of Upland cotton, Half and Half and Wilds. The results indicate that recurrent selection, together with intercrossing between the chosen plants throughout a number of generations, raises the frequency

of superior gene combinations in self-fertilized plants considerably above that of the F_2.

Heyne, E. G. & Finney, K. F. F_2 progeny test for determination of bread baking quality in hard red winter wheat. (*p. 88*).

Milling and baking tests substantiated the hypothesis that evaluation of flour quality in the F_5 and F_6 of the bulk increase of F_2 plants is a satisfactory method of selection.

Ivy, H. W. & Mason, L. F. Inheritance of resistance to earworm in corn. (*p. 88*).

A study was made of the inheritance in maize of resistance to earworm. Although the results do not fit any standard Mendelian ratio, they suggest segregation for a single pair of genes with partial dominance for susceptibility.

Jodon, N. E. Status of rice genetics. (*p. 89*).

An account is given of achievements in the field of rice genetics, together with detailed data on chromosome constitution, linkage groups, mutations and inheritance of characteristics of economic importance.

Johnston, T. H. Inheritance of resistance to physiologic races of loose smut, Ustilago nuda, *in winter barley.* (*pp. 89–90*).

Crosses were made between various resistant and susceptible varieties of winter barley in order to study the inheritance of resistance to loose smut.

In the variety North Carolina Hooded 26, resistance proved to be dominant. The high degree of resistance of Dohadak to race 4 appears to be conditioned by two genes. The variety North Carolina Hooded 26, in which resistance appears to be conditioned by only a small number of genes, was resistant to more races of *U. nuda* than any other of the seven varieties tested.

Jones, D. L. & Ray, L. Genetic studies of the stormproof type boll in American Upland cotton. (*p. 90*).

Stormproof-type cottons are characterized by the possession of locks which adhere tightly to the carpel walls and do not fluff or fall from the boll. This character appears to be due to a single incompletely dominant gene, with considerable variation due to noninherited factors. Transference of this gene to other species is relatively simple.

Jones, J. E. The influence of modifying genes on Fusarium *wilt resistance in Upland cotton.* (*pp. 90–91*).

Investigations indicated that resistance to *Fusarium* wilt in Upland cotton was conditioned by one major pair of genes with absence of dominance and an unspecified number of modifiers.

Resistance to *Fusarium* was not linked in any way with resistance to the nematode *Rotylenchulus*, which is associated with wilt.

Knowles, P. F. & Houston, B. R. Inheritance of resistance to Fusarium *wilt in flax.* (*pp. 91–92*).

Some selections of the flax variety Dakota have been found to have a high degree of resistance to local races of *Fusarium* wilt, and will be used for breeding purposes.

In four of these selections, resistance has been found to be due to two complementary genes. Each of the four selections segregated differently in the F_3.

Konzak, C. F. Mutations induced in oats by thermal neutron irradiation. (*p. 92*).

Data are given on mutations induced in oats by means of thermal neutron irradiation. Mutants obtained included virescent, yellow-green, red leaf, dwarf and banded-leaf types.

Koo, F. K. S., Moore, M. B., Myers, W. M. & Goto, S. Genic relationship of three types of stem rust resistance in certain oat crosses. (*p. 92*).

Results of experimental crosses suggest that the factors in the oat varieties Richland and White Russian conditioning resistance to stem rust are independent, and not allelic.

Kramer, N. W. & Karper, R. E. Breeding practical sorghum hybrids. (*p. 93*).

The practical value which sorghum hybrids would have is discussed. Two methods using male sterility have been developed, and hybrid seed can now be produced economically.

Leng, E. R. Effects of heterosis on the major components of grain yield in corn. (*p. 94*).

F_1 maize hybrids were found to exceed their inbred parents in total grain yield, weight of grain per ear, number of kernels per ear and number of kernels per row. An analysis of row number indicated that most hybrids derived from parents having 18 or more rows did not show heterosis in row number, whilst hybrids derived from parents with 16 rows or less nearly always did so.

Loeffel, F. A. & Rinke, E. H. Effectiveness of individual plant selection for breeding corn resistant to the European corn borer, Pyrausta nubilalis *Hbn.* (*p. 94*).

Individual plant selection proved an effective method of isolating those maize genotypes most resistant to *P. nubilalis*. Selection for resistance did not prove to be at the expense of other desirable agronomic characteristics.

Metzger, R. J. Induced autotetraploidy in red clover. (*pp. 95–96*).

Meiosis in colchicine-induced tetraploid red clover was studied. Quadrivalents, univalents and bridges were observed during metaphase I and anaphase I. Aneuploidy was rare.

Miller, J. D. & Lambert, J. W. Variability and inheritance of reaction of barley to certain races of stem rust. (*pp. 96–97*).

The genetics of resistance of barley to races 15B and 59 of stem rust were studied. One major gene pair governs the reaction of the plant, resistance being dominant.

Pate, J. B. Breeding studies on a tip blight disease of kenaf, Hibiscus cannabinus *L.* (*p. 97*).

Tip blight, tentatively attributed to *Colletotrichum hibisci*, has occurred in plantings of kenaf in South Florida. A high degree of resistance was obtained by selection within the commercial El Salvador variety, and attempts are being made to transfer this resistance to susceptible varieties.

Quinby, J. R. & Karper, R. E. Inheritance of height in sorghum. (*pp. 98–99*).

Height in sorghum is shown to be due to four independently inherited genes, which in the recessive state produce dwarfness, and to a modifying complex. Tallness is partly dominant. One of the recessive height genes is unstable and reverts to the dominant condition at the rate of 1 to 1200.

Rivers, G. W. & Futrell, M. C. Seedling reaction of oat varieties and strains to Puccinia coronata (*Pers.*) *Cda. race 101 under greenhouse conditions.* (*p. 99*).

Twenty-five varieties of oats were tested for resistance to race 101 of crown rust at three different periods of the year. The varieties responded differently at different periods, under greenhouse conditions.

Ross, J. G. & Franzke, C. J. Studies on colchicine induced variants in sorghum. (*p. 99*).

Colchicine treatment of sorghum seedlings resulted in three variants with an unchanged chromosome number. It is suggested that somatic reduction of the chromosome number took place with concurrent chromatin rearrangement and subsequent restoration to the diploid number. The practical possibilities of colchicine-induced mutants are stressed (cf. *PBA* Vol. XXIII, Abst. 349).

Self, F. W. & Henderson, M. T. Inheritance of strength of fiber in the Upland cotton strain AHA 50. (*pp. 99–100*).

Strength of fibre in the Upland cotton strain AHA 50 is determined by either four or five pairs of genes. It is suggested that selection of individual plants in the F_2 and later generations of hybrid crosses should prove an effective means of obtaining lines with high strength of fibre.

Sieglinger, J. B. The occurrence of an extra-dwarf mutant milo. (*p. 100*).

An extra-dwarf mutant of dwarf milo, CI 332, is reported. The extra-dwarfness is associated with factors for good exsertion of head and sterility.

Smith, W. K. The environment in the breeding of sweetclover. (*pp. 100–01*).

The closer the environment in which selection is made resembles the environment in which the crop is to be grown, the more effective will selection become.

Stephens, J. C. & Holland, R. F. Cytoplastic male-sterility for hybrid sorghum seed production. (*p. 101*).

In reciprocal crosses between milo and kafir, the F_1 plants were fertile, but some partial male sterility occurred in F_2 populations of crosses using milo as the female parent. This may prove of value in commercial production of hybrid sorghum seed.

Webster, O. J. Sorghum production in Nigeria and the A. E. Sudan of Africa. (*p. 102*).

A report is given of sorghum varieties native to Africa which may prove of value to the sorghum breeder. Mention is made of varieties: with seeds twice the size of those grown in the USA; possessing a yellow endosperm; with extra long glumes affording protection from birds; and with glumes which do not open at anthesis.

Wells, D. G., Ramsey, D. S. & Akhter, S. W. Seedling and adult plant reactions to leaf rust in a cross of a T. timopheevi*—common wheat derivative with Yorkwin.* (*pp. 102–03*).

One major genetic factor governs seedling reaction to races 5, 15 and 58 of leaf rust. A

high degree of resistance to races 5 and 15 was dominant over susceptibility. High resistance was recessive to susceptibility to race 58. The same major genetic factor conditioned plant reaction in the field.

Wellhausen, E. J. & Prywer, C. Relationship between chromosome knob number and yield in corn. (*p. 103*).

In the study of the origin of different races of maize, it was found that races resulting from hybridization usually possessed a higher knob number than the average of their parents. Investigations are being made to determine whether a correlation exists between knob number and yield of grain.

Webster, G. T. Embryo culture of sweet-clover species hybrids. (*p. 104*).

By means of embryo culture fertile hybrid plants have been produced from the cross *Melilotus alba* x *M. officinalis*.

Zimmerman, L. H. & Van Horn, D. L. Performance of castor bean inbred lines and their hybrid combinations with Nebraska 145–4. (*p. 104*).

Hybrids between superior yielding inbred lines of castor beans generally gave yields higher than those of either parent.

Zoebisch, O. C., Libby, McNeill & Libby. The genetic and environmental variation of some quantitative characters of pine-apple. (*p. 104*).

The writers point out that the Smooth Cayenne variety of pineapple has existed for from 150 to 500 years. As it produces no seed, and is propagated vegetatively, genetic variation is due to mutation. These have affected almost every important characteristic, so that this variety is now a mixture of genotypes.

944 **What's new in farm science. Annual Report of the Wisconsin Agricultural Experiment Station, 1953** : Bull. No. 509 : Pt. 2 : Pp. 64.

Oats. The cultivation of Branch oats (cf. *PBA*, Vol. XXII, Abst. 308) is expanding in Wisconsin. The variety is highly resistant to *Septoria*.

Maize. Two recently released hybrids are described. Wisconsin 283 husks easily and is resistant to lodging. Wisconsin 355 A has well-developed ears, is uniform in its growth and easy to husk.

Sudan grass. Field trials and laboratory tests have shown that Piper has the highest yield and lowest prussic acid content among varieties grown in Wisconsin.

Cucumber. Further particulars are given of the scab-resistant variety Wisconsin SR6 (cf. *PBA*, Vol. XXIII, Abst. 3064).

Soya bean. Blackhawk (cf. *PBA*, Vol. XXI, Abst. 2258) has outyielded other varieties in most of southern and west central Wisconsin.

Sweet corn. Two new hybrids, Wisconsin Golden 900 and Wisconsin Golden 950, are described (cf. *PBA*, Vol. XXIII, Abst. 2287).

945 Longwell, J. H. & Shirky, S. B. **Agricultural research builds up new efficiency in farming. Annual Report of the Missouri Agricultural Experiment Station, 1952** : Bull. No. 584 : Pp. 138.

Wheat. By means of nullisomic analysis, a gene for resistance to some races of stem rust has been located on chromosome VIII of Hope. A selection of Clarkan x Vigo gave the highest yields in trials of commercial wheats and new strains. Early hybrid selections of Purplestrain-Chinese-Michigan Amber x Kawvale were increased for yield tests, as they showed promise with respect to yield, earliness, shortness of straw and resistance to leaf rust and loose smut.

Oats. Mo. 0–200 gave the highest yields in variety tests (cf. *PBA*, Vol. XXIII, Abst. 2607). The high yielding, stiff-strawed variety Mo. 01–205 (Columbia x Victoria-Richland) is to be distributed; it is resistant to smut, rust and *Septoria* blight.

Maize. Hybrid production continued. Seedling type provides a useful basis of checking the identity of stocks. Mutation studies by L. J. Stadler have shown that the genes *A* and *R* are complex, consisting of separate components (cf. *PBA*, Vol. XXIII, Abst. 5).

Barley. The new winter barley B–400 was grown commercially for the first time. In variety tests, the experimental strains from Admire x Early Beardless, Ky. 2 x Early Beardless and Ward x Early Beardless gave outstandingly good yields.

The Tennessee hooded barleys, hybrid selections involving Early Beardless, and B 637 (Michigan Winter x Early Beardless) have shown strong resistance to *Ustilago nuda*, *U. nigra* and *U. hordei*, respectively.

Cotton. F_2 plants from crosses of Coker 100 Wilt with varieties superior in yield, early maturity or fibre quality were selected for wilt resistance. F_2 selections were back-crossed to each parent.

Tomato. Resistance to race 1 of *Fusarium oxysporum* f. *lycopersici* was associated with the

production of a gum-like substance in the vascular tissues, the spread of the hyphae thus being prevented.

Soya bean. New crosses involving L6–1503, D623–9, Adams and Ogden were carried out, to produce material differing widely in maturity. Breeding for resistance to bacterial pustule continued; Clemson Nonshatter has been used as the resistant parent in crosses with Lincoln, Boone and Ogden.

946 Boerger, A.
La genética contemporánea del Río de la Plata. (**Present-day genetics in the River Plate area**).
Cienc. e Invest. 1953 : **9** : 435–45.

The work referred to in this general review includes the induction of *Neurospora* mutants by camphor, studies on yeast genetics, the production of wheat varieties resistant to *Puccinia glumarum*, oats to *P. coronifera*, rye-grass to *P. coronata* and green aphid, lucerne to nematode and flax to *Septoria lini*. In Argentina the production of double-cross maize hybrids is referred to, their yield having exceeded that of the local varieties by 30–70%. Maize yields have been very materially increased in Uruguay too by the use of hybrid corn and special measures are being taken to conserve maize germplasm in Brazil, Argentina and Uruguay. Reference is made to crosses between *Aleurites* spp. and *Joannesia princeps* and between *Araucaria imbricata* and *A. angustifolia*.
Similar outlines are given on developments in animal breeding and eugenics.

947 **Prospects for agricultural development in Latin America.**
FAO UN, Rome : Pp. 146. (Mimeographed).

One section of chapter V emphasizes the importance of breeding and the production of improved seed of crops, briefly surveying the progress so far achieved in different Latin American countries (pp. 92–96).

948 Jaarverslag van het Departement van Landbouw, Veeteelt en Visserij, Suriname over 1951. (**Annual report of the Department of Agriculture, Animal Husbandry and Fisheries, Surinam, for 1951**) : Pp. 95.

Rice. Varieties from the USA and Indonesia were compared in trials. Skrivimankoti, Mas and D52/37 gave the highest yields, Java varieties tending to be superior in yield to American ones.
The future breeding programme is outlined. Tests are to be conducted with strains introduced from British Guiana.

Oil palm. Selected seed of *Elaeis guineensis* has been imported from Nigeria.

Groundnuts. The varieties Virginia and Spanish have been imported from the USA and are to be tested under local conditions.

Soya bean. Two selections from Ringgit have given considerably higher yields than the parent variety.

949 **Twenty-seventh Annual Report of the Department of Scientific and Industrial Research, New Zealand, 1953** : Pp. 107.

Wheat. Hilgendorf, a new wheat yielding flour of good baking and keeping qualities, has been developed (cf. *PBA*, Vol. XVIII, Abst. 1513). Its yield is slightly below that of the standard variety Cross 7.

Oats. The English variety Milford has been introduced into New Zealand. It is a short-strawed, high yielding variety, resistant to lodging and suitable for combine harvesting.

Swede. The F_1 of crosses between a club-root resistant and a susceptible variety have proved resistant. F_2 and back-cross generations are now undergoing tests.
The variety Wilhelmsburger Øtofte is resistant to both *Brevicoryne brassicae* and *Myzus persicae*.

Rape. Two lines from the cross Club-root Resistant x Broad Leaf Essex approached the latter variety in earliness and yield. Further resistant selections have been made from the F_2 of this cross.

Flax. Selection work for complete rust resistance has been started on the F_2 material of the crosses D 83 x Tammes Pale Blue and 806/3 x Tammes Pale Blue.
Foreign varieties have been introduced, two of which, the Russian 1288/12 and the Turkish Ech 121, show a high percentage of immune plants.
Studies on the genetics of rust resistance are in progress, the aim being to create a greater diversity of genes in breeding for resistance to rust, in order to reduce the risk of all varieties being stricken at the same time.

Tobacco. Virginia Gold, a new variety imported from the USA, has given high yields of good quality leaf and has proved resistant to black root rot.
Good progress is being made in raising flue-cured types incorporating the resistance of *Nicotiana glutinosa* to black root rot.
Crosses are being made to obtain commercially acceptable varieties possessing resistance to *Verticillium* wilt.

The susceptibility of 22 varieties of tobacco to *Phytophthora* was tested. Oxford 1 and 3, Kentucky 34, Dixie Bright 101 and 102, Florida 301 and RG showed considerable resistance.

Hops. Hybridization experiments to transfer the black root rot resistance of the medium yielding Fuggle variety to the high yielding Californian variety have been made.

Tests show that most introduced English varieties have a greater degree of resistance to black root rot than have local varieties.

950 **Report of the Waite Agricultural Research Institute, South Australia, and associated activities of the Commonwealth Scientific and Industrial Research Organization 1950-1951.**

Adelaide 1953 : Pp. 62.

Wheat. In trials during 1950–51, Insignia 49 and Quadrat were superior in yield to other varieties tested.

A genetic analysis was made of the resistance of Oro and Orfed wheats to one race of *Tilletia caries* and three races of *T. foetida*. The isolation of a number of different phenotypes exhibiting marked differential reactions to the four races indicated that the inheritance of resistance is dependent on a number of genes.

Three genes were identified in the course of genetic studies on resistance to *Erysiphe graminis* var. *tritici*. The "Thew" gene was detected in eight varieties and the "Sonora" gene in three. The third gene was found in the variety Ulka. Preliminary studies indicate a simple mode of inheritance of resistance to *Ustilago tritici*.

Barley. Back crossing has resulted in strains of Prior and Research resistant to South Australian races of *Erysiphe graminis* var. *tritici* and to *Ustilago hordei*.

Linseed. In variety trials during 1950, Punjab 5, Punjab CI 20 and Punjab 23 proved superior in yield and oil content. In 1951 several new strains bred from the cross Punjab x Walsh gave good results.

951 Barrau, J.

Research in Queensland on tropical plant and animal industries.

Tech. Pap. S. Pacif. Comm. 1953 : No. 43 : Pp. 72. (Mimeographed).

Agricultural research work in Queensland is reviewed from the point of view of its possible application in the economic development of the Pacific Islands.

Rice. The best results were obtained with the Indian marshland variety, Pachchaiperumal.

Cotton. Coker 100, Acala 5675 and 442, and Empire gave the best results in varietal tests at the Ayr station.

Jute. At the South Johnstone Bureau of Tropical Agriculture, Innisfail, *Corchorus capsularis* gave the best results for vigour and resistance to disease and parasites.

Tobacco. The varieties Gold Dollar, Kelly, Hicks, Yellow Mammoth and 402 have given the best results in the tropical areas of Queensland.

Sunflower. Jupiter is the most suitable and most productive variety for the Ayr district.

Mandarin. Mandarin hybrids are being studied at Redland research station with a view to developing early ripening and disease-resistant varieties with improved quality fruit.

Avocado. Fuerte is the most important commercial variety in Queensland.

952 Childers, L. E.

Here's your plant industry station.

Sth. Seedsman 1953 : **16** : No. 12 : 29, 82.

A popular account of the work of the Station at Beltsville, Maryland, USA, is given. Breeding programmes are in progress to improve tomato, lettuce, Lima and field beans, onion, potato, strawberry, blueberry, grapes, the castor oil plant, sugar beet and tobacco.

953 Mudra, A.

Die Anwendung der Grosszahl-Methodik bei Sortenprüfungen. (**The utilization of the large number method in variety trials**).

Wiss. Z. Humboldt-Univ. Berlin 1952/53 : No. 3/4 : 99–105.

The advantages and disadvantages of single plant selection, as compared with bulk progeny tests, are discussed. The former method is more reliable, and enables favourable mutations and higher yielding individual plants, which would be overlooked in the bulk progeny tests, to be retained for breeding purposes.

A method is described by which lots of 200 seeds are sown, and the value of the variety assessed on their yield. This method is shown to be statistically more accurate than the bulk selection method, and also enables minor improvements to be detected. Certain technical difficulties are, however, present in the suggested method, and ways of overcoming them are suggested.

954 Yamasaki, M.

(Some considerations on the theory of the potassium chlorate method).

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 149–52. [Japanese].

A synopsis is given of the author's researches

on the use of $KClO_3$ as an indicator of various physiological characteristics. In general, resistance to the toxic action of $KClO_3$ is positively correlated with (1) sensitivity to cold, (2) resistance to drought, (3) late maturity, (4) hybridity as against homozygosity, and (5) sex in diecious plants, in some cases with male sex, in others with female. It is believed that $KClO_3$ is reduced to KClO, which is the substance that is directly toxic to the plant; the reducing capacity of the plant is, in turn, related to the characteristics cited. The original publications have been summarized *passim* in *Plant Breeding Abstracts.*

955 **General Meeting of ASSINSEL in Deauville, July the 4th, 1953.**
ASSINSEL, Paris 1953 : Pp. 16. (Mimeographed).

The object of the ASSINSEL* is to secure protection and royalties for plant breeders. Branches of the association already exist in Belgium, Spain, the Netherlands, Italy and France, and it is hoped to form others in Germany and Austria.

At the Annual General Meeting, a paper was read containing recommendations on the registration and international exchange of hybrid maize seed.

956 GADD, I.
Definitioner av begreppen sort, stam och elit jämte tillämpningsbestämmelser härtill. **(Definitions of the concepts variety, strain and élite, with regulations for their practical use).**
Medd. Frökontrollanst., Stockh. 1952 : No. 27 : 26–28.

The definitions, drawn up by the Board for Original Seed in Sweden, are explained for the use of Swedish plant breeders and other interested persons.

957 NILSSON-LEISSNER, G.
Nya originalbetecknade sorter och stammar. **(New varieties and strains designated Original seed).**
Forsök o. Forskn. 1953 : **10** : p. 94.

This report of the Swedish Board for the Certification of Original Seed records varieties and strains of various crop plants officially approved in 1953. By a change in the regulations governing certification, foreign-bred varieties, e.g. the Danish Pajbjerg Rex oat, may now be approved as Original seed.

New Swedish Original varieties and strains include the following, all bred by the Swedish Seed Association: Segerhavre II [Victory oat II]; Blixthavre [Lightning oat], Extra-Klockhavre II [Extra-Bell oat II]; the early, high yielding, small-seeded field pea Bello; the broad bean Primus; the tetraploid turnip Sirius; the swede Viktoria, and the sugar mangel Nova II. All, except Bello, have already been mentioned in *Plant Breeding Abstracts* from other sources.

958 PUGSLEY, A. T.
Genetics in the service of agriculture.
Agric. Gaz. NSW 1953 : **64** : 399–400, 441–42; 478–80.

A review of the development of cultivated species is given, together with an account of the history of genetics and crop breeding and the part played by Farrer in wheat improvement. The breeding of disease-resistant varieties, the application of hybrid vigour in the improvement of cross-fertilized plants and the principles of induced mutation are described.

959 RAJAN, S. S.
A note on the chromosome numbers of some plants.
Indian J. Genet. 1952 : **12** : p. 93.

The chromosome number of the following plants was determined at the Indian Research Institute, New Delhi: *Vicia bengalensis* ($n = 7$); *V. fulgens* ($n = 7$); *V. globosa* ($2n = 14$); *V. ferruginea* ($2n = 12$); *V. graminea* ($2n = 14$); *V. sinkiangensis* ($2n = 12$), *Cassia artemisioides* ($n = 24$); and *Linum marginale* ($n = 15$).

960 POHJANHEIMO, O.
Kasvinjalostuksen uusista mahdollisuuksista. Polyploidia kasvinjalostuksen palveluksessa. **(New possibilities in plant breeding. The employment of polyploidy in plant improvement).**
Siemenjulk. Hankkijan KasvinjalosLaitos Tammisto 1946 : 232–37.

A short review of the potentialities of polyploidy induced by colchicine is given, with special reference to the prospects of utilizing polyploid red clover, winter rye and wheat for Finnish conditions.

961 BELL, G. D. H.
Polyploidy and plant breeding.
NAAS quart. Rev. 1953 : No. 22 : 47–54.

The value of chemically-induced autopolyploids and allopolyploids is discussed, with reference to the progress so far obtained in different countries.

962 **N.I.A.B. Crop Conference, 1953.**
(Mimeographed) (Press release).

In *The barley crop*, H. Hunter discussed the

* Association internationale des sélectionneurs professionnels pour la protection des obtentions végétales (International Association of Professional Plant Breeders for the Safeguarding of Breeding Achievements).

malting and feeding quality of the English crop in relation to variety, husbandry, methods of harvesting, seed purity, and the extent to which high yield and good quality for malting can be combined. C. S. Elliott, in *Results of recent barley variety trials*, examined the quality and field characters of Scandinavian barleys and of hybrids from crosses between British and Scandinavian varieties. Among the latter hybrids, Proctor is considered to be a valuable malting type (cf. *PBA*, Vol. XXIII, Abst. 1180). Two other hybrids are also to be placed on the recommended list: HH 14/4/4, an early maturing selection, with good grain quality and higher yielding-capacity than Kenia; and HB 34/15/2/38, a late-maturing, short-strawed selection of the Spratt-Archer type but giving a heavier yield than this type. In recent trials of six-row winter feeding-barleys, some entries have proved to be earlier, and shorter and stiffer in the straw than the old commercial six-row barley used as control.

The requirements of maltsters and brewers were discussed in *Malting quality of barley* by A. Cory-Wright, who commented upon recently introduced continental barleys and on new varieties bred in England.

S. T. Skelton dealt with *Quality of seed stocks.*

O. S. Rose contributed a paper on *The sugar beet crop.* In *Sugar beet varieties*, L. A. Willey discussed the results of recent trials carried out by the NIAB in cooperation with the Sugar Beet Corporation (cf. Abst. 519).

L. Hector Read, in *The economic importance of wheat quality*, commented upon the milling and flour qualities most likely to confer commercial acceptability upon varieties. He suggested that the point of view of the flour manufacturer should be sought as a guidance in breeding. In *Flour, bread and biscuits*, S. Humphries stressed that English wheats are used for two entirely different main purposes, for bread and biscuit manufacture: production should be planned according to this utilization. Milling behaviour was also considered. In *The assessment of quality in wheat: the value of different varieties*, E. N. Greer gave a discussion of some of the problems involved in experimental testing of milling and baking quality. D. G. Bullard contributed *Quality in wheat: the farmers' viewpoint.*

963 James, E.
Plant introduction men seek new crops for the South.
What's New Crops Soils 1953 : **6** : No. 1 : 17, 22.

An account is given of the work of the Primary Plant Introduction Station at Experiment, Georgia, and of the methods used to evaluate new crop plants. Between 40 and 50 new plant introductions are at present undergoing trials or being used in breeding programmes at the station.

964 **Overseas plant exploration.**
Rur. Res. CSIRO 1953 : No. 5 : 12–15.

An account is given of the work of the Plant Introduction Section of the Commonwealth Scientific and Industrial Research Organization Division of Plant Industry, Australia. In recent years expeditions to Africa, South America and the Mediterranean area have resulted in the introduction of a number of plants, in particular, pasture species, forage legumes and groundnuts, which should prove of value under Australian conditions, and be of use to plant breeders.

965 **Manual for testing agricultural and vegetable seeds.**
U.S. Dep. Agric. Agric. Handb. 1952 : No. 30 : Pp. 440.

This illustrated manual provides technical information on the official seed-testing procedures adopted for agricultural and vegetable crops in the United States. After an introductory account of seed laws and seed-testing laboratories, sections on the following are given: seed sampling and testing equipment; obtaining the seed sample; general procedures for determining purity; procedures for testing purity in the major groups of seeds; general methods of making germination counts; germination tests for different types of seed; examination for seeds of noxious weeds; origin of seeds; testing for trueness of variety; testing for moisture content; tolerances of variations; calculations, records and reports; and taxonomic identification. The final three sections deal with more fundamental aspects: development, structure and hereditary characteristics of seeds; physiology of seeds; and pathological considerations in seed testing.

966 Jarmizin, D. V. & Starkov, A. S.
(Breeding and seed growing research work in the irrigated zone of the Rostov province).
Selekcija i Semenovodstvo (Breeding & Seed-growing) 1953 : No. 5 : 3–9. [Russian].

Varieties of wheat, maize, rice, forage plants, cotton and sunflower adapted to cultivation on irrigated lands in the province are described.

Wheat. Zernogradka [Grain Town], Odessa 3 and Odessa 12 are listed as approved winter

wheat varieties until new short-strawed types with improved resistance to lodging and fungi are ready to supersede them. They are productive and show a high degree of resistance to lodging, the two latter varieties also being resistant to drought. Of the spring varieties tested, the hard wheats Melanopus 69, Donskaja Garnovka 672 and Narodnaja [Popular] and the soft wheat Albidum 43 yielded best.

Maize. Approved varieties include the hybrids Don from Belaja Zubovidnaja Harjkovskaja [Harjkov White Dent] x Voronež 76 and Rostov from Minnesota 13 Extra x Gruševskaja Mestnaja [Local Gruševskaja]. A new hybrid developed at the USSR Institute of Plant Industry (VIR), VIR 46, yields well on irrigated land and has been made a standard.

Rice. Several varieties have been found suitable for cultivation under the periodical irrigation system. The most productive of them, Belyi SKOMS [White SKOMS], is also interesting for its tolerance of soil salinity. It has a growth period of 110–120 days and a husk content of 19%. The 1000 kernel weight is 27–28 g.

Forage plants. Some grasses and legumes showing good response to improved water supply are listed. They include the lucerne Maynč, which yields 138·6 c. hay per ha. and the Severo-Kavkazskiĭ Dvuukosnyĭ [North Caucasian Two Cuts] sainfoin, which produces 114 c. green substance per ha.

Cotton. In recent trials 611–B, D–18 and OD–1 have proved the earliest and the most productive varieties.

Sunflower. Ždanov 8281, Stepnjak 1483 and VNIIMK* 6540, interesting on account of their productiveness, high oil content, resistance to *Orobanche* and rust, and tolerance of *Homeosoma nebulella*, are listed as approved varieties.

967 MATHER, K.
Genetics and plant pathology.
Nature, Lond. 1953 : **172** : 989–90.

An account is given of the meeting held by the British Mycological Society in London, 16 October 1953, to discuss the subject of "Genetical aspects of plant disease."

K. Mather considered the general nature of the host-disease relationship from the genetical point of view.

E. W. Buxton described investigations on variation in *Fusarium oxysporum*, as a pathogen of *Gladiolus*. Heterocaryosis is an important cause of morphological variation, and possibly also of variation in pathogenicity.

P. R. Day gave an account of research on *Cladosporium fulvum*. Three genes for resistance to this fungus are known to occur in the tomato, so that eight possible races can be distinguished by all-or-none tests of infectivity. Seven races have been recognized in Canada, and of these, five have been found in Britain. No conclusive evidence of heterocaryons has so far been secured. Marker mutations have been induced by radiation, but no mutation affecting pathogenicity has so far been detected, possibly for technical reasons. The marker mutations were used to study the effects of competition in a susceptible host between races of the fungus with different degrees of host specialization; no consistent relation between host range and degree of virulence was found.

H. W. Howard dealt with breeding potatoes for resistance to disease, particularly late blight. Mixed stands of potatoes have revealed the simultaneous presence of all the strains of the late-blight fungus necessary to attack host plants with different types of resistance. The view is expressed that in future breeding use of the type of resistance shown by *Solanum demissum* may have to be reinforced, or even replaced, by selection of the quantitative type of resistance found in *S. tuberosum* itself.

R. D. Reid gave an account of the work on breeding strawberries resistant to red core (*Phytophthora fragariae*).

968 GORLENKO, M. V.
(The immunity of plants to diseases and pests).
Priroda (Nature) 1953 : No. 10 : 94–96. [Russian].

The substance of this paper is contained in a more detailed report summarized in *PBA*, Vol. XIII, Abst. 2516.

969 SUGAWARA, T.
(Studies on the amount of oxygen required by the roots of crop plants. I. On biochemical reduction of nitrate by the roots of crop plants and varietal differences).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 139–44. [Japanese].

The quantity of nitrous acid formed in culture solution was determined for 12 varieties of soya bean, 14 of barley, 7 of wheat, 12 of sweet potato, and 14 of rape. Rice was found not to reduce nitrate. Varietal differences in nitrate reduction were noted in all other cases, and a

* Vsesojuznyĭ Naučno-Issledovateljskiĭ Institut Masličnyh Kuljtur [USSR Scientific Research Institute for Oil Plants].

general inverse correlation was found between amount of nitrous acid formed and the water requirement.

970 Selmer-Anderssen, C. & Løchen, A.
Betraktninger omkring samarbeid i landbruksforskningen. (**Considerations concerning collaboration in agricultural research**).
Tidsskr. norske Landbr. 1953 : No. 7–8 : 201–04.

It is suggested that Norwegian scientific bodies should take steps to establish a system of organized collaboration within the various branches of agricultural research, and also between them, where separate fields of investigation overlap.

CEREALS

971 Ishibashi, Y.
The distribution of the varieties for rice, Upland rice, barley and wheat in Tochigi prefecture.
Utsunomiya Daigaku Nogakubu Hokoku /Bull. Coll. Agric. Utsunomiya Univ. 1952 : **2** : 52–67.

Maps are given showing the distribution of varieties of wheat, barley and rice cultivated in the Tochigi prefecture, Japan, in 1951. Information on the dates of earing and ripening of the varieties is also provided.

972 S., J.
Exkursioner förenar nytta med nöje. (**Excursions combine profit with pleasure**).
Tidskr. Lantm., Helsinki 1953 : **35** : 131–34.

The cereal varieties mentioned in this account of excursions to various research centres in Finland include: the new spring wheat Svenno, which is 1–2 days earlier than Kärn [Kernel] and possibly less exacting as regards soil; the new Norwegian barley, Domen (cf. *PBA*, Vol. XXIII, Abst. 1959); the early, short-strawed wheat, Vakka [Bushel], bred at Jokkis (cf. Abst. 978); and the variety Okey which seems suitable for Åboland.

973 Bjaanes, M.
Korn og kornsorter. (**Cereals and varieties of cereals**).
Norsk Landbr. 1953 : **19** : 188–91.

The merits of Scandinavian varieties of barley, oats and spring wheat are compared, with special reference to yield, resistance to lodging, and suitability for combine-harvesting and for different localities in Norway.

The new spring wheat, Norrøna, bred at Møystad (cf. Abst. 216), receives special mention for its combination of earliness with high yield of grain and its strong straw. A still earlier variety, Snøgg II [Rapid II], is also characterized by strong straw and a comparatively high yield, considering its earliness.

974 Babamov, L.
(**A basis for the standardization of cereal varieties in Macedonia**).
Zborn. Zemjod.-Ispit. Inst. Skopje/Ann. Agric. Res. Inst. Skopje 1952 : **1** : 3–58. [Macedonian].

Varieties of wheat, oats, rye and barley, selected on the basis of their productiveness in one or more districts of Macedonia, are listed.

975 **Annual Report of the Agricultural Research Officer, Department of Agriculture, Cyprus, for 1952** : Pp. 33. (Mimeographed).

The local hybrid selections S 1 and S 2 are being multiplied for commercial distribution (cf. *PBA*, Vol. XXIII, Abst. 2528). At Athalassa, where a new station has been established, crosses and back crosses involving introduced and local wheats were made. Introductions and local selections and hybrids of barley were also studied.

976 **Milns seeds. Spring 1954.**
Pp. 44. Miln & Co. (Seedsmen) Ltd., Boughton, Chester, England.

This catalogue includes a brief article by J. D. Palmer on varieties of wheat, oats and barley recently introduced from the continent or bred in Great Britain. Mention is made of new hybrids developed by the firm, and now under laboratory and field trial. These include two wheat hybrids claimed to equal French varieties in both yield and standing quality, and to possess the advantage of high quality grain. E. N. Greer contributes a short discussion on quality in wheat from the standpoint of the miller, stressing that the characters required are largely hereditary.

977 Paljčikova, E. D.
(**Breeding oats and barleys at Hibiny**).
Trud. Prikladnoĭ Bot. Genet. Selekcii (Bull. Appl. Bot. Pl.-Breed.) 1948 : **28** : No. 1 : 91–108. [Russian].

Oat. Hybrids which are early and produce high yields of good quality grain when grown in the Soviet subarctic regions have been bred from some Scandinavian and Russian material. Hibiny 01, from Nidar x Ligovo II, improved by various Mičurinite methods in recent years,

has given a family which reaches maturity in 69 days and outyields the standard Nidar by 0·9–2·3 c. per ha.

Barley. Promising hybrids, bred at Hibiny, include 460–H/29 from (Maškin x Transcaspian 3828) x Iotum and 182–H/5 from Holt x Algiers 7557, which are earlier than the standard Holt and have a higher 1000 kernel weight. K 2/14, which has been selected from some Karelian material, is as early as Holt and surpasses it in yield. It is being improved by intravarietal pollination and training upon rich soil.

978 Valle, O.
Om skördetröskning. (**On combine harvesting**).
Tidskr. Lantm., Helsinki 1953 : **35** : 129–30.

In a broadcast on 26 July 1953, Finnish and Swedish varieties of cereals were discussed with reference to their earliness and suitability for combine-harvesting in Finland. A new autumn wheat, Vakka [Bushel], bred by the Plant Breeding Division of the Agricultural Research Institute in Finland will soon be released.

979 Bell, G. D. H.
The history of cereal cultivation.
Rev. Ass. Agric., Lond. 1953 : No. 20 : 16–24; No. 21 : 4–16.

An historical account of cereal cultivation and of the origins of cereal crops is given, and the importance of breeding programmes aimed at producing varieties with increased yield and disease resistance stressed. Cereal varieties are tending to become more and more specialized in their combination of desirable economic characteristics, and properties which were not formerly considered significant in breeding have become so as the requirements of the grower and consumer have changed.

980 Haferkamp, M. E., Smith, L. & Nilan, R. A.
Studies on aged seeds. I. Relation of age of seed to germination and longevity.
Agron. J. 1953 : **45** : 434–37.

Germination tests were carried out on crop seeds which had been harvested and stored at the Dry Land Experiment Station, Lind, Wash., from 1917 to 1950. Seeds of wheat, barley, oats, maize, lucerne and pea were viable after storage for as long as 31 to 33 years. Varietal differences in longevity were detected. Seeds stored with intact hulls retained their viability longer than threshed seeds. Hulls also had a marked effect in inhibiting the growth of mould.

981 Gunthardt, H., Smith, L., Haferkamp, M. E. & Nilan, R. A.
Studies on aged seeds. II. Relation of age of seeds to cytogenetic effects.
Agron. J. 1953 : **45** : 438–41.

Cytogenetical investigations were carried out on one variety each of *Triticum vulgare, T. durum, Hordeum vulgare* and *Secale cereale* and on two varieties of *Pisum sativum*, whose seeds had been stored for 1 to 32 years at the Dry Land Experiment Station, Lind, Wash. (cf. Abst. 980). In all varieties the frequencies of chromatinic bridges and acentric fragments in the cells of root and shoot tips increased with the age of the seed. Data are given on the frequencies of interchanges in the pollen mother cells of the plants of the barley and wheat varieties. Only rings of four were found; their frequencies were quite low, even in plants from the oldest seeds, but apparently increased with the age of the seeds. Other meiotic aberrations such as anaphase bridges, univalents, isochromosomes and fragments were also observed. In addition, data were obtained on the frequencies of seedling mutations in the head progenies of the varieties of wheat and barley. In the wheats the frequencies of chromosomal aberrations were far in excess of the seedling mutations, but in barley they were similar. The possible nature of the relationship between the reduced viability of old seeds and the nuclear changes in plants raised from them is discussed. The types of aberrations appear to be identical with those induced by ionizing radiations (cf. Abst. 1093). Reasons are given for concluding that the dosage of natural radiation received by the stored seeds was insufficient to account for the frequencies of cytogenetical changes.

982 Pohjakallio, O.
Über den Einfluss der Umweltfaktoren auf die Dauer der Zeit von der Aussaat bis zum Ähren—(Rispen)—Schieben bei Sommergetreide. (**On the influence of environment on the period from sowing to heading in summer cereals**).
Comm. Biol. Soc. Sci. Fenn. 1951 : **11** : No. 6 : 1–18.

The rate of growth of various cereals was compared for different latitudes in Finland. Temperature was found to be the most important determining factor. An increase in daylight beyond 18–19 hours per day did not hasten the development of summer cereals to any appreciable degree. Reduction in the intensity of light retarded the heading of Binder barley and

Diamond spring wheat to a greater extent than that of Golden Rain II oats.

983 Sigle, K.
Strohlänge und Ertrag unserer Getreidesorten. (**Straw length and yield of our cereal varieties**).
Mitt. dtsch. LandwGes. 1954 : **69** : 4–6.
Varieties of wheat, oats, rye and barley were compared to determine whether the total straw yield per given area of short-strawed, freely tillering varieties was equal to that of long-strawed varieties with fewer stalks. In the case of each cereal it was found that the long-strawed varieties gave a higher yield of straw than the short-strawed varieties. The latter were, however, usually considerably superior to the former in grain yield.

984 Elomaa, A.
Viljan peittauskokeiden tuloksia vuosilta 1928–1950. (**Results of seed treatment experiments with cereals during the years 1928-50**).
Valt. Maatalousk. Tiedon. 1952 : No. 226 : Pp. 43.
Comparative results are given for named varieties of the principal Finnish cereal crops, the experiments dealing with a number of different seed dressings and their effect on germination and yield.

985 **Near East wheat and barley nurseries —1953. Barley nurseries. Wheat bunt nurseries. Wheat rust nurseries.**
FAO UN 1953. (Mimeographed).
Tables give information on the wheats and barleys studied in countries of the Near East in tests organized under the auspices of the Food and Agriculture Organization (cf. *PBA*, Vol. XXIII, Abst. 973 and Vol. XXIV, Abst. 906). In addition to code numbers, variety names and other designations, countries of supply and countries where the varieties were originally developed, ratings for disease resistance and notes on other agronomic characters are provided for some of the entries.

986 Oswald, J. W. & Houston, B. R.
Yellow dwarf of cereals.
Calif. Agric. 1953 : **7** : No. 11 : 6–7.
Tests were made in California of the varietal reaction of cereals to the virus disease yellow dwarf. Four barley varieties, C I 1227, C I 1237, C I 2376 and Abate, were highly resistant. The barleys Rojo [Red] and Hanchen, the oat Kanota, and the wheat Sonora 37 were tolerant of the disease.

987 **Guide to field experiments, demonstrations and farm crops at the Edinburgh School of Agriculture 1953** : Pp. 104.
Part II summarizes the results of variety trials of wheat, oats, barley and forage beet carried out in 1952 on the farms of the Edinburgh School of Agriculture, Scotland. Appendix III provides descriptive notes on the cereal varieties studied.

WHEAT

988 Jakubciner, M. M.
(**Wheats from Poland and the neighbouring provinces of the USSR**).
Trud. Prikladnoĭ Bot. Genet. Selekcii (Bull. Appl. Bot. Pl.-Breed.) 1948 : **28** : No. 1 : 48–76. [Russian].
The principal wheats cultivated in Poland and western provinces of White Russia and the Ukraine are described, with notes on their origins and breeding value. Winter wheats of the Wysokolitewska [Tall Lithuanian], Sandomirka or Lapirovka types, referred to as the northern group of varieties, are interesting on account of their hardiness. The hard spring wheat Puławy and many winter varieties of the Banat group are interesting on account of their earliness. Some of the White Russian spring wheats and winter wheats of the northern and Banat groups are moderate in their soil requirements. The west European group of winter wheats, consisting of squareheads and their derivatives, show resistance to shedding and have firm straw. The Polish varieties produce large grain and show resistance to yellow rust. More varieties are susceptible to brown rust races 13 and 20 than to 21.

989 Negretti, E.
I risultati di cinque anni di punte granarie. (**The results of five years of record wheat yields**).
Humus 1953 : **9** : No. 10 : 5–14.
In competitions for the highest wheat yields, held in 1948–53 in the Lombardy province of Italy, a large number of varieties, both old and new, took part and the results are assessed. The variety Orlandi 10, distinguished by resistance to frost and lodging, proved a strong competitor to Damiano Chiesa in certain areas but not in as many as had been expected. The new variety Mara displayed great standing power and gave top yields in several localities both in the plain and on high ground, being able to withstand both cold and waterlogging. Favourable mention is accorded, among others, to

Fortunato, S. Pastore and a reselection of Damiano Chiesa made at Cremona.

990 GRILLOT, G.
L'amélioration des blés durs au Maroc. (**The improvement of hard wheats in Morocco**).
Bull. Éc. franç. Meun. 1951 : **125** : 161–65.
A review is given of the progress made in breeding *Triticum durum* at the Rabat Experimental Station and its subsidiaries.

991 **World catalogue of genetic stocks. Wheat. Supplement No. 3.**
FAO UN, Rome 1953 : Pp. 29. (Mimeographed).
The third supplement contains contributions from Belgium, France, Spain, Turkey, the United Kingdom and USA (cf. *PBA*, Vol. XXIII, Abst. 1077).

992 **World List of Wheat Breeders.**
FAO UN 1953 : Pp. 18. (Mimeographed).
Compiled by the Food and Agriculture Organization of the United Nations, the list provides the names and addresses of wheat breeders in many countries.

993 **World List of Wheat Breeding Stations.**
FAO UN 1953 : Pp. 11. (Mimeographed).
Issued by the Food and Agriculture Organization of the United Nations, the list gives the addresses of wheat breeding stations in 45 countries.

994 ÅKERMAN, Å.
Vårvetesorter. (**Spring wheat varieties**).
Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1952 : 6–8.
The lines followed in wheat breeding in Sweden are exemplified by reference to the characteristics of the sequence of varieties bred there, including Svalöfs Kolben [Svalöf Club], Extra-Kolben I and II, Progress, Fylgia, Rival and Diamant [Diamond]. Recent local trials indicate that the advances made as regards yield and strength of straw have been accompanied by a reduction in crude protein content and gluten quality. Progress has been made in regard to disease resistance (cf. *PBA*, Vol. XXIII, Abst. 251), but the production of an early ripening, high quality wheat, adapted to mechanical harvesting and reliable in yield, remains a problem for the Swedish breeder.

995 WAGNER, S.
"Altgold," eine neue Rotkorn-Sorte. (**Old Gold, a new red spelt wheat variety**).
Mitt. schweiz. Landw. 1953 : **1** : 145–48.
Provisional data on a new variety of spelt wheat, Altgold [Old Gold], a selection from the cross Oberkulm 3 x Sandmeier Oberkulm 11, are presented. Altgold is very similar in appearance to Oberkulm 3, but matures considerably earlier and gives a higher yield than the latter variety.

996 DIONIGI, A.
Il "grano-orzo." (**Wheat-barley**).
G. Agric. Domen. 1953 : **63** : p. 258.
A form of wheat in which three spikelets are borne at each rachis node has been produced in crosses between certain wheat forms. Because of its resemblance to six-rowed barley it is named wheat-barley.

997 PANÉ MERCÉ, J.
Un nuevo trigo de espiga múltiple. (**A new wheat with branching ears**).
Agricultura, Madr. 1953 : No. 258 : 552–55.
The branched *Triticum turgidum* or miracle wheat was grown in the Spanish province of Lérida some 40 years ago but went out of cultivation because of its low yield, late maturity and poor grain quality. Attempts to cross it with *T. vulgare* gave rise to sterile hybrids until recently when some fairly fertile hybrids have been produced after previous treatment of the branched wheat with colchicine. The wheat Pané 194 was obtained in this way, using the treated plant as pollen parent, and is described as being branched but less so than the miracle wheat, which it excels in yield, size and quality of grain; it is ten days earlier in ripening and very resistant to cold and lodging.

998 NAKAJIMA, G.
[**Fertility, external characters and chromosomes of F_2 and F_3 plants raised from hybrids between rivet wheat (*T. turgidum*, $n = 14$) and rye (*S. cereale*, $n = 7$)**].
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 174–76. [Japanese].
F_2 plants with $2n = 42$ chromosomes were more fertile than F_2 plants with $2n = 41$ chromosomes, but the percentage germination of grains from the 41-chromosome plants was rather higher. The chromosome number in the F_3 ranged from 39 to 60, with the mode at 42.

The 42-chromosome F_3 plants had the highest seed set. Tables are given comparing the morphology of the inflorescence in the F_2 and F_3 generations.

999 NAKAJIMA, G.
A cytological study on the intergeneric F_1 hybrid between *Triticum sphaerococcum* and *Secale cereale*.
Cytologia, Tokyo 1953 : **18** : 43–49.

In the first meiotic division of the pollen mother cells of F_1 hybrids ($2n = 28$) of *T. sphaerococcum* ♀ x *S. cereale*, 28–20 univalents and 0–4 bivalents were observed, with 0 bivalents forming the mode. Syndesis apparently occurred only between the genomes A, B and D of *T. sphaerococcum*. At anaphase I, the chromosomes usually showed a fairly well balanced numerical distribution to the poles. Most of the F_1 pollen was sterile; one F_2 plant was however produced.

1000 NAKAJIMA, G.
[**The fertility and germination capacity of the seeds of F_1 plants of (*Triticum turgidum* x *Secale cereale* x *T. vulgare*) x *T. turgidum*, and the external characters, fertility and somatic chromosomes of the F_2 plants**].
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **2** : 89–92. [Japanese].

In the F_1 generation of the above cross, seed was obtained from plants with 30, 31 or 32 chromosomes; fertility ranged from 1·3 to 31·4%. In the F_2, the chromosome numbers were 28, 29, 30, 31 and 34. The F_2 plants resembled *T. turgidum*, though the segregates with 28 and 29 chromosomes had shorter stems and longer ears than this species. Fertility in the F_2 was much higher than in the F_1.

1001 LISTOWSKI, A. & SZYMUSIK, I.
O wpływie następczym pochodzenia ziarna na plon pszenicy ozimej. (**On the subsequent influence of the origin of grain on yields of winter wheat**).
Roczn. Nauk rol. 1952 : Ser. A : **66** : No. 1 : 7–28.

The selected varieties used in this investigation were the Polish wheats Graniatka Dańkowska [Faceted Dańkowska] and Ostka Skomoroska [Awned Skomoroska] and Śląska [Silesian] IV, a West European type. The behaviour of the three wheats was studied in three different localities, viz. at the Grodkowice Plant Breeding Station, at the Chełm Experimental Farm and at the Małyszyn Research Institute. Tables and graphs show the results of the two-year experiments.

The observed variations in yield indicate that, irrespective of the agricultural method used, the conditions prevailing at the site of cultivation affect the mother plants and through them the seed and so the next generation.

1002 BABAMOV, L.
(**The effect of thousand-grain and hectolitre weights and origin of seed upon the yielding capacity of wheat**).
Zborn. Zemjod.- Ispit. Inst. Skopje/Ann. Agric. Res. Inst. Skopje 1952 : **1** : 233–35. [Macedonian].

When selected for large seed, Skopje 21 germinated and reached maturity 2–3 days earlier and produced more grain. The seed of plants trained upon rich soil has given no more productive plants than the seed of plants grown on other soils.

1003 GUGUVČEVSKI, M.
(**Effects of external conditions upon the productiveness of our wheats**).
Zborn. Zemjod.- Ispit. Inst. Skopje/Ann. Agric. Res. Inst. Skopje 1952 : **1** : 245–62. [Macedonian].

American, a standard for the Skopje district of Macedonia, has been outstripped in yield on well drained land by Skopje 21 and on moist soils by Visoka Šutica [Tall Šutica]. Banatka, a standard for the Strumica and Bitola districts, was also outyielded by these varieties on moist soils in the first-named district and on any type of soils and in wet or dry seasons in the latter. The early varieties Mentana and 8/7 were superior in the Kočani district; in the Skopje district they were also superior but only under conditions of low rainfall.

1004 REMESLO, V. N.
(**Evolution of new species in fields of branching wheat**).
Selekcija i Semenovodstvo (Breeding & Seed-growing) 1953 : No. 5 : 34–37. [Russian].

Conversions of a spring variety of *Triticum turgidum* and some hybrids derived from it into different species of wheat or into barley and rye are reported from Mironovo, where the material was sown as a winter wheat. The new forms included some highly productive forms of *T. durum* and *T. vulgare*.

1005 SEARS, E. R.
Nullisomic analysis in common wheat.
Amer. Nat. 1953 : **87** : 245–52.

Four methods of using nullisomics for determining the position of genes on the chromosomes are considered: (1) observation of the absence

of the effect of an ordinary dominant recessive gene in a given nullisomic; (2) growing the F_2 populations from crosses with each of the 21 nullisomics, followed by estimation of the segregation ratios to discover the critical family; (3) detection of the significant homozygous F_2 disomics by analysis of F_3 progenies of a few cytologically selected individuals; and (4) production of disomic lines each having one particular pair of chromosomes from the variety under analysis substituted for the corresponding pair of the standard variety, by means of repeatedly back-crossing monosomic offspring with the respective nullisomics of the standard. It is pointed out, however, that because of difficulties due to reduced vigour and fertility, use of nullisomics is usually impracticable. In actual practice, nullisomics I, VII and XXI are maintained as lines, the last two being used in most crosses. For the remaining 19 chromosomes, monosomics are employed instead of nullisomics. The effect of translocations in methods (1) and (4) is discussed.

So far four recessive genes have been identified which are hemizygous or ineffective in single dose; their dominant alleles show no dosage effect. The recognition of such recessives by methods (1) and (2) is described.

1006 Johnson, V. A.
Environmental factors affecting plant height in winter wheat.
Agron. J. 1953 : **45** : 505–08.

Investigations were carried out on the independent effects of photoperiod, light intensity and geographical locality on the height of winter wheat varieties. Taller growth was obtained with short photoperiods than with long. Three varieties out of the five studied showed differential response to day length. The effect of reduced light intensity during the seven weeks before ripening can be an important factor influencing height, as shown by the response of Pawnee. Reductions to 64 and 34% of normal light caused significant increases in height; further reductions in light intensity resulted in marked decreases in height, grain yield and kernel weight. Height and internode length were determined for 13 varieties grown at four centres in Nebraska and in three other states. The usual number of above-ground internodes was five, irrespective of relative height or locality. Although the height of individual varieties differed widely with locality, their relative height tended to be similar at all four centres. Height reduction due to drought was not equal in tall and short varieties, if expressed in linear units of measurement, but was proportional to the maximum height attained under less unfavourable conditions; thus short varieties would tend to be less variable in height than tall.

1007 Misra, G.
Photoperiodic response of some Indian wheats.
Science 1953 : **118** : 445–46.

In the wheats R–1 and R–9, which are economically valuable mutants obtained by X irradiation, long-day treatment of the seedlings caused earlier emergence of the ears, compared with the controls. Maximum earliness was produced when the seedlings were 8 to 16 days old at the commencement of treatment.

1008 Huokuna, E.
Tuloksia viljalajien varisevuuskokeista. (**Results of tests of susceptibility to shattering of some cereal crops**).
Maatalous 1949 : **42** : 248–49.

The susceptibility to shattering of various cereals cultivated in Finland was studied. Of the winter wheats, Varma and Olympia, and of the summer wheats, Sopu and Diamond I, were the most resistant among the varieties tested. Sisu, Sol II and Golden Rain among the oats, Ensi and Toivo among the ryes, and Herta among the barleys also showed considerable resistance to shattering.

1009 Heyland, K.-U.
Qualitätsuntersuchungen am Stroh von deutschen Weizensorten. (**Investigations of the straw quality of German wheat varieties**).
Z. Acker- u. PflBau 1953 : **97** : 129–54.

Different varieties are compared as to the anatomical structure, organic composition, fodder value and cellulose content of their straw.

1010 Pohjanheimo, O.
Vehnän kypsyysaste ja myllytysarvo. Tutkimuksia eri kypsyysasteilla korjattujen vehnien arvosta myllyjen ja leipomoitten raaka-aineena. (**Degree of maturity of wheat and milling value. Some researches into the value of improved wheats with different degrees of maturity as raw material for milling and baking**).
Siemenjulk. HankkijanKasvinjalosLaitos Tammisto 1946 : 141–61.

A detailed analysis is presented of the relationship between the degree of maturity at time of harvest and the various properties connected with milling and baking in the following: the spring wheats Pika II [Express II], Tammi,

Timantti [Diamond] and Kimmo, and the winter wheats Varma [Sure], Panu and Sukkula II.

1011 Hale, W. S., Ali Mohammad & Mecham, D. K.
Composition of the pentosans extracted by acid from wheat: its relationship to milling behavior.
Cereal Chem. 1953 : **30** : 513–21.

Previous experiments on soft wheats from the northwest Pacific region of the United States indicated that pentosan extract and milling properties are negatively correlated (cf. *PBA*, Vol. XXIII, Abst. 2585). Further investigations on ten varieties have shown that the amount of xylose extracted is inversely correlated with flour yield and milling score. Xylose + arabinose extract is as consistently related to milling properties as xylose extract only. Arabinose extract, however, was not consistently related with milling behaviour. The results from experiments on four of the varieties confirmed the previous conclusion that the pentosans of the endosperm rather than of the bran are responsible for the correlations obtained.

1012 Brej, S.
Studia nad jakością odmian pszenic jarych i ozimych w warunkach Dolnego Śląska. (**Studies on the quality of varieties of spring and winter wheats under the conditions prevailing in Lower Silesia**).
Roczn. Nauk rol. 1952 : No. 65 : 143–69.

Nine spring wheats and ten winter wheats, representing varieties long cultivated in Poland, were studied; some of these varieties were from Central Poland, where climate and soil conditions differ completely from those in Lower Silesia. Field trials showed that the spring wheats gave as high grain yields as the winter wheats under the conditions in Lower Silesia. The spring wheats of Polish origin were higher yielding than those of German origin, but the winter varieties of German origin gave somewhat higher yields than those of the Polish-bred wheats.

The baking value was found to be affected not by heredity alone, but also by soil, weather and method of cultivation. The baking values of spring and winter varieties of Polish origin were higher than those of varieties of German origin. The values for the firmness and elasticity of the dough, for a given variety, increased with improvement in environmental conditions, which also affected the content and quality of the gluten.

1013 Memoria de la Reunión de Tecnología Experimental de la Molinería y Panificación realizada en la Estación Experimental de Pergamino 30 y 31 de Octubre de 1951. (**Report of the Meeting on the Experimental Technique of Milling and Baking held at the Pergamino Experimental Station on 30 and 31 October 1951**) 1952 : Pp. 110. (Mimeographed).

The following paper was presented to the congress:

Haertlein, J. & Lemos, O. R. Estudio comparativo de molienda experimental con molinos Bühler y Brabender. (*Comparative study of experimental milling with Bühler and Brabender mills*). (*pp. 7–25*).

Tests were made with the three varieties 38 MA, Sinvalocho and Klein Lucero and uniform conditions for applying the two methods are suggested. The degree in which the results of experimental milling correspond to the behaviour of the variety under industrial conditions was debated in the ensuing discussion. Other matters discussed were the methods of determining gluten content and the importance of assessing other factors such as diastatic power, proteolytic activity and flour colour, and the value of farinograph and alveograph readings and of baking tests. A subcommittee was appointed to discuss the matters further.

1014 Dedecca, D. M. & Purchio, M. J.
Variedades agrícolas de trigo (*Triticum aestivum* L.). [**Agricultural varieties of wheat (*T. aestivum* L.)**].
Bragantia 1952 : **12** : 19–53.

Observations have been made on nearly 1000 wheat varieties introduced into the State of São Paulo and descriptions are given of 27 varieties that show promise for use in cultivation or in breeding work. The characters studied, in addition to morphological features of plant, ear and grain, included important agronomic properties such as time of ripening and resistance to rust, lodging and drought. The origin of the varieties is given when known and a key is provided for their identification.

1015 Jakubciner, M. M.
(**Some new species in the group of wheats with 28 chromosomes**).
Trud. Prikladnoĭ Bot. Genet. Selekcii (Bull. Appl. Bot. Pl.-Breed) 1948 : **28** : No. 1 : p. 218. [Russian].

Changes in the nomenclature of wheats, involving three new specific names, *Triticum*

araraticum, *T. aethiopicum* and *T. turanicum*, are proposed.

1016 Elliott, C. S., Greenwood, H. N. & Reiss, B. C. R.
Spring sowing of winter cereals.
Agriculture, Lond. 1953 : **60** : 378–83.

The results of trials carried out by the National Institute of Agricultural Botany at a number of centres in Britain to study the suitability of wheat varieties for spring sowing are discussed. A preliminary classification of 25 varieties, in order of their increasing suitability for late spring drilling, is provided. In addition, comments are made on the behaviour of winter oat and barley varieties when spring sown.

1017 Coť, I. V.
(Yield components of different varieties of spring wheat and their variability).
Selekcija i Semenovodstvo (Breeding & Seed-growing) 1953 : No. 5 : 15–22. [Russian].

At Saratov, characters determining yield and their variability in relation to density of sowing were investigated in Lutescens 62, Sarrubra, Erythrospermum 841, Candicans 75/09 and Melanopus 69.

1018 Markowski, A.
Laboratoryjne metody oceny zimotrwałości pszenic ozimych. **(Laboratory methods of estimating winter hardiness of winter wheats).**
Roczn. Nauk rol. 1952 : No. 65 : 71–113.

Amongst the methods studied of estimating winter hardiness the most accurate was the direct method, based on freezing the plant material in a cold chamber. Though statistical analysis could not be applied, it was concluded that the good agreement, as regards the order of the varieties, between the average value for winter killing of the individual varieties under laboratory conditions and the observations on their hardiness in the field, was not fortuitous. Testing of indirect methods showed that chemical determination of the sugar content of the leaf in hardened plant material is also an efficient method of estimating winter hardiness, provided conditions of growth are uniform. Results from refractometric estimation of the dry-matter content of the cell sap suggest that it is unlikely that the viscosity of the cell sap exactly corresponds to the frost resistance of varieties, since frost damage kills some of the cells. Theories to explain the increase in the viscosity of sap from dead cells are discussed. The direct method of estimating frost resistance and the chemical analysis of sugar content are only satisfactory when applied to already hardened plant material. Vernalization before hardening does not seem to be a necessary condition in applying these two methods to the estimation of frost resistance.

1019 Cicin, N. V.
(The aims of biological research in the light of the resolutions of the September plenary meeting of the CK KPSS*).
Priroda (Nature) 1953 : No. 11 : 3–10. [Russian].

This survey of biological research in the USSR includes references to wheat hybrids 599, 186 and 1, obtained by crossing wheat with some *Agropyron* species. Descriptions of the hybrids, which combine high yield with resistance to lodging, have already been published in *Plant Breeding Abstracts* (cf. Vol. XXIII, Abst. 2560).

1020 Pugsley, A. T. & Carter, M. V.
The resistance of twelve varieties of *Triticum vulgare* to *Erysiphe graminis tritici*.
Aust. J. biol. Sci. 1953 : **6** : 335–46.

A study was made of the resistance of 12 varieties of *T. vulgare* to a South Australian isolate of *E. graminis* var. *tritici*. Three types of resistance were observed. In 8 of the varieties a common gene Ml_t conferred resistance at all stages of growth, and was also found to be completely linked with a gene giving resistance to race 135AB of *Puccinia triticina*.
A second type of resistance is attributed to a gene Ml_u, which was found in only one of the 12 varieties examined. Three further varieties derived their resistance from a gene Ml_s, which confers resistance from the three-leaf stage onwards.

1021 Holton, C. S. & Vogel, O. A.
Evidence of pathogenic specialization in dwarf bunt of winter wheat in the Pacific Northwest.
Plant Dis. Reptr. 1952 : **36** : p. 434. (Mimeographed).

Evidence has been obtained that an additional race of *Tilletia caries* attacks varieties possessing the factor for bunt resistance derived from the wheat Martin. Previously only one race of *T. caries* causing dwarf bunt had been recognized.

* Central Committee of the Communist Party of the Soviet Union.

1022 Griffith, R. B., Zscheile, F. P. & Oswald, J. W.
Resistance of wheat to bunt associated with inability to produce chlamydospores.
Phytopathology 1953 : **43** : p. 473. (Abst.).

Experiments under different environmental conditions indicated that the resistance of Baart 38 to race T–1 of *Tilletia caries* was associated with the inability of the fungus to produce chlamydospores, rather than with inability to infect and undergo vegetative development.

1023 **Concho superior winter wheat for Oklahoma area.**
Sth. Seedsman 1953 : **16** : No. 11 : p. 46.

Concho, a new variety of hard winter wheat, is described. It yields well, is highly resistant to bunt and leaf rust, and has moderately stiff straw.

1024 Villanueva Novoa, R. & Rojas Mendoza, E.
Pruebas de resistencia en invernáculo, con las razas 14, 15B y 17 de *Puccinia graminis tritici* y de otros caracteres en material progenitor y en híbridos de primera generación de trigo. (**Tests of greenhouse resistance with races 14, 15B and 17 of *P. graminis tritici* and of other characters in parent material and in first-generation hybrids of wheat**).
Inf. Estac. agríc. La Molina 1953 : No. 82 : Pp. 16. (Mimeographed).

Data presented show the seedling reaction of a number of varieties and their F_1 hybrids, from which it is seen that resistance to races 15B and 17 was dominant, and resistance to *Erysiphe graminis* var. *tritici* was usually intermediate; awnlets were dominant to awns.

1025 Vargas Saco, R.
Variedades de trigo para la costa central del Perú. (**Wheat varieties for the central coast of Peru**).
Inf. Estac. agríc. La Molina 1953 : No. 83 : Pp. 16. (Mimeographed).

Varieties such as María Escobar, which is resistant to races 14 and 15B of *Puccinia graminis* var. *tritici*, can no longer be used in Peru because of the increasing prevalence of race 17. Observations on a number of other varieties, the results of which are presented, show that three hybrids from the La Molina research station, Marina 49, Marina 50 and Mariache 50, combine resistance to all three races with satisfactory baking quality, earliness and resistance to *P. glumarum* and *Erysiphe graminis*. The first two of the hybrids are from crosses of María Escobar x NA 101, and Mariache 50 is from María Escobar x H 44–Marquis.

1026 Villanueva Novoa, R.
Herencia de la resistencia a la raza 15B de *Puccinia graminis tritici* y de otros caracteres en los cruces recíprocos de los trigos Kenya 58 y Spring Progress. (**Inheritance of resistance to race 15B of *P. graminis tritici* and of other characters in reciprocal crosses of the wheats Kenya 58 and Spring Progress**).
Bol. Cent. Nac. Invest. Exp. Agríc. La Molina 1952 : No. 47 : Pp. 20. (Mimeographed).

Data are given on the distribution of race 15B in Peru and on the reaction of hybrids between the resistant variety Kenya 58 and the susceptible Spring Progress. The F_2 contained a number of semiresistant plants as well as the resistant and susceptible groups; the proportions of 12 resistant : 3 semiresistant : 1 susceptible suggest the operation of 2 genes for resistance. The awnlets of Kenya 58 were almost completely dominant to the awns of Spring Progress, monofactorial ratios being observed in the F_2. Monofactorial ratios were observed for glume colour too, the heterozygotes being intermediate. No indication of linkage was observed between the three characters studied.

1027 Swaebly, M. A. & Hart, H.
Infection of resistant varieties of wheat by races of *Puccinia graminis tritici*.
Phytopathology 1953 : **43** : p. 485. (Abst.).

The development of some races and biotypes of stem rust may vary considerably on the same variety. As an example of this variation, the behaviour of race 15B and its biotypes is described.

1028 Abdel-Hak, T.
Physiological races of wheat stem rust in Egypt.
Nature, Lond. 1953 : **172** : 802–03.

Twelve races of *Puccinia graminis* var. *tritici* have so far been found on *Triticum vulgare* wheats in Egypt: races 17, 19, 21, 42, 14, 9, 24, 59, 88, 53, 123 and E_1 (Egypt), in order of decreasing prevalence. A large number of varieties and selections have been tested for their reaction to five or more of these races. Most of the wheats showing resistance were

lines developed in Egypt from crosses of local varieties with resistant introductions.

1029 Gibler, J. W., Narvaez M., I. & Enciso C., T.
Races 49 and 139 of the wheat stem rust pathogen further complicate breeding programs.
Phytopathology 1953 : **43** : p. 472. (Abst.).

Races 49 and 139 began to increase in prevalence in Mexico during the summer of 1952, attacking the commercial wheats Kenya 324, Lerma and Kentana, which are resistant to race 15B. Subsequent greenhouse and field tests indicated that all the Kenya varieties resistant to 15B are susceptible to races 49 and 139, with the exception of Kenya 338 AC 2 E 2 and Kenya 338 AA 1 A 2. Many commercial wheats from the United States, Canada, and Brazil are resistant to both races 49 and 139, which will probably soon become more prevalent than 15B in central and northern Mexico. The factors for resistance to 15B and for susceptibility to 49 and 139 have been found to be strongly linked in most Kenya varieties.

1030 Villanueva N., R.
Progresos en el mejoramiento del trigo para resistencia a las royas, especialmente para la raza 15B de *Puccinia graminis tritici*. (**Progress in breeding wheat for resistance to rusts, especially for race 15B of *P. graminis tritici*).**
Inf. Estac. agríc. La Molina 1953 : No. 80 : Pp. 34. (Mimeographed).

Examination of the rust occurring on susceptible hosts grown at the La Molina experimental station in Peru showed race 15B to be the most prevalent race of *P. graminis* var. *tritici*, the next in importance being race 17; most of the varieties of a world collection proved susceptible to these races, there being only 57 resistant forms in a collection of 435. F_2 hybrids at the station proved to be segregating in respect of resistance to stem and leaf rusts, but some of the later generations contained segregates resistant to both, and some of these were also resistant to *Erysiphe graminis*. Mexican hybrids possessed a type of partial resistance to stem rust not present in the Peruvian wheats. The useful sources of resistance to stem rust races 14, 15B and 17 are enumerated, and some of the hybrids obtained from them are referred to as having doubled or even trebled the yields of wheat in certain zones as compared with the old standard varieties. Other hybrids are mentioned which have been badly attacked in Peru though having been reported as resistant elsewhere.

1031 Favret, E. A. & Vallega, J.
Inheritance of resistance to Argentine races of *Puccinia glumarum* in the wheat "Chino 166."
Phytopathology 1953 : **43** : p. 471. (Abst.).

Except in one cross, the resistance of Chino 166 [Chinese 166] and Chino 166 x Lin Calel to races 30, 37 and a new race was inherited as a monogenic dominant character. In the exceptional cross, Sinvalocho MA x Chino 166, resistance appeared to depend on a recessive factor pair. This anomalous behaviour may have been due to the known chromosomal instability of Sinvalocho MA.

1032 Borlaug, N. E.
New approach to the breeding of wheat varieties resistant to *Puccinia graminis tritici*.
Phytopathology 1953 : **43** : p. 467. (Abst.).

In an attempt to develop wheats capable of remaining resistant to leaf rust in spite of changes in the relative prevalence of different races, composite varieties are being produced, each consisting of a mechanical mixture of back-cross lines, phenotypically similar but genotypically dissimilar for resistance. Many lines can be developed and held in reserve; with alterations in the prevalence of races, suitable lines can be omitted or substituted.

1033 Futrell, M. C. & Shands, R. G.
A transfer of stem rust resistance from *Triticum dicoccum* variety Khapli to common wheat.
Phytopathology 1953 : **43** : p. 472. (Abst.).

Khapli, resistant to race 15B of stem rust, was crossed with varieties of *T. vulgare*. The F_1 plants from each cross gave a reaction to 15B intermediate between the responses of the two parents. Severe chlorosis and necrosis, genetically determined, resulted in the death of the F_1 plants of several hybrids at different stages of development. A selection of the cross between CI 12632 x Frontana and Khapli, however, headed before chlorosis appeared. A number of the F_3 lines of the second back cross to *T. vulgare* were resistant to race 15B when tested in the seedling stage under greenhouse conditions. The agronomic value of these lines has not been determined.

1034 Papavizas, G. C.
Studies on the infection type produced on Kubanka wheat by certain physiologic races of *Puccinia graminis tritici.*
Phytopathology 1953 : **43** : p. 481. (Abst.).
Normally Kubanka shows a mesothetic (type X) reaction to races 32, 36, 49 and 139 of leaf rust. Changes in this reaction to susceptibility or resistance, according to the conditions of temperature and light, are described.

1035 Campos, T., A., Gibler, J. W. & Borlaug, N. E.
Correlation of seedling and adult plant reaction to stem rust of wheat.
Phytopathology 1953 : **43** : p. 468. (Abst.).
Data from crosses involving Mentana and many other wheats have indicated that stem rust resistance in the seedling stage is not necessarily associated with resistance in the adult plant stage.

1036 Atkins, I. M.
More wheat for Central Texas.
Sth. Seedsman 1953 : **16** : No. 12 : 74, 94.
Frisco, a new variety of early maturing winter wheat, from a cross between Red May and Fronteira, is described. In appearance it is similar to Red May, but gives a higher yield and possesses the leaf and stem rust resistance of its Fronteira parent. It is not, however, resistant to race 15B of stem rust and is therefore recommended only for North Central Texas.

1037 Smith, G. S., Sturlaugson, V. & Heermann, R.
A new durum wheat—Stewart-221.
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1953 : **15** : 208–09.
Stewart–221, a new variety of durum wheat selected at the North Dakota Experiment Station from a cross between Mindum and Stewart, is described. In most respects it is similar to the Stewart parent, but gives a higher yield, slightly better quality straw, and is easier to thresh. It is resistant to races 11, 17, 49 and 139 of stem rust.

1038 Cortázar Sagarminaga, R.
Mejoramiento de trigos para la región centro y norte de Chile. (**Improvement of wheat for the central and northern regions of Chile**).
Agricultura téc., Santiago 1952 : **12** : 69–79.
Data are presented which show the changes in the wheat varieties grown in Chile during the period 1926–1944. A particular feature which distinguishes present-day varieties from those grown in earlier years is their resistance to *Puccinia glumarum*. Some of the hybrids now under investigation, whose characteristics are enumerated, are possessed also of resistance to *P. graminis*, *P. triticina* and lodging.

1039 Suneson, C. A., Schaller, C. W. & Davis, L. L.
California's wheat.
Calif. Agric. 1953 : **7** : No. 10 : p. 4.
During the period 1937–1950, 15 improved backcrossed strains, resembling the original popular varieties except for the added character of disease resistance, have been distributed in California. Information is given on the 1951 acreages sown to 11 of the improved strains, five of which are resistant to both bunt and rust, and six resistant to bunt only.

1040 Voĭtčišina, O. N.
(**Development of resistance to rust in hybrids of winter wheat**).
Selekcija i Semenovodstvo (Breeding & Seed-growing) 1953 : No. 5 : 31–33. [Russian].
A method of improving rust resistance in wheat (cf. *PBA*, Vol. XXII, Abst. 2606) has been successfully tested on new intervarietal hybrids bred at the North Osetian Breeding Station. The material comprised various direct and reciprocal crosses, hybrids obtained by unrestricted open pollination and hybrids from restricted multiparental pollination or free pollination involving one pollinator. The experiments showed that acquired resistance to rust was a heritable character and that it was intensified when the material was treated for two generations in succession. The experimental plants bore more viable seed than the controls and were more productive.

1041 Eckroth, E. G. & McNeal, F. H.
Association of plant characters in spring wheat with resistance to the wheat stem sawfly.
Agron. J. 1953 : **45** : 400–04.
Plant characteristics of 180 varieties of spring wheat were studied at the Montana Agricultural Experiment Station in relation to resistance to sawfly (*Cephus cinctus*). None of the varieties showed immunity, and stem solidity was the only character associated with resistance in either *Triticum vulgare* or *T. durum*. A higher degree of resistance was found in *T. durum* than in *T. vulgare*; even the hollow-stemmed

T. durum wheats were less susceptible than hollow-stemmed varieties of *T. vulgare*. The cause of the higher degree of resistance within *T. durum* is however unknown. In *T. durum* and hollow-stemmed *T. vulgare* varieties the combined percentage of stems with larvae or eggs was most closely associated with percentage of stems cut by the larvae by harvest time; in the case of solid-stemmed *T. vulgare* wheats percentage of stems with larvae showed a higher correlation with stem cutting. In view of the failure to transfer the stem solidity of *T. durum* to *T. vulgare* (cf. *PBA*, Vol. XIV, Abst. 710), and also the environmentally caused instability of the stem solidity of *T. vulgare*, more wheats are to be screened for additional characters determining resistance.

1042 Bayles, B. B.
Report of the Uniform Southern Wheat Nurseries 1952.
U.S. Dep. Agric. 1953 : Pp. 12. (Mimeographed).

The results of tests of wheat varieties in the southern states during 1952 are summarized, tabulated data being given on yield, test weight, date of heading, plant height, lodging, forage value, and reaction to leaf rust, stem rust, *Septoria*, powdery mildew and soil-borne mosaic. Attention is drawn to the increased frequency of occurrence of soil-borne mosaic in Virginia and North Carolina; at least a moderate degree of resistance would seem desirable in varieties released in the future. Atlas wheats are especially susceptible to mosaic. The release of Anderson (Leapland-Fronteira) by the South Carolina Agricultural Experiment Station is mentioned (cf. *PBA*, Vol. XXII, Abst. 1806); release of Y 2375 (Trumbull-Frondoso) is still under consideration.

BUCKWHEAT

1043 Petelina, N. N.
(Vegetative hybridization of buckwheat).
Selekcija i Semenovodstvo (Breeding & Seed-growing) 1953 : No. 5 : 37–40. [Russian].

At the Aleksandrovskaja Breeding Station, vegetative hybrids between Ivanovo, a productive and early local variety, and Tetraploidnaja [Tetraploid], interesting for its large seed and resistance to shedding and lodging, were obtained. The two varieties are incompatible in sexual crosses. Some hybrids, mostly of Ivanovo on Tetraploidnaja, combined the good economic characters of their parents and exhibited heterosis in the first and second seed generations. Many F_1 families had straw as long as, or longer than, Tetraploidnaja and produced appreciably more grain per plant than Ivanovo or the standard variety Kazanj. The seed was not as large as that of Tetraploidnaja but much larger than that of Ivanovo and Kazanj. The F_2 segregated for earliness, and some plants were earlier than Ivanovo. Morphological changes in a few F_2 plants, involving flower or leaf characters, were observed.

1044 Murakami, K.
(Studies on the physiology of artificial polyploids. II. Changes in the water and total nitrogen contents in different organs of artificial 4-ploid buckwheat).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **2** : 103–05. [Japanese].

Though no constant overall difference was noted between the diploid and tetraploid strains, the content of water in the stem of the diploids became higher than in the tetraploids when flowering began and during the early stages of fruit development. The stems of the tetraploid strain throughout development and the tetraploid roots during flower bud differentiation and the early stages of flowering contained less total nitrogen than the diploids. The total nitrogen content of the leaves was lower in the tetraploids immediately after germination and at the time of flower bud differentiation, but was higher at maturity.

1045 Modilevsjkiĭ (Modilevskiĭ), Ja. S.
(A cytological and embryological description of the grain types of a cultivated buckwheat showing premature cessation of development).
Bot. Ž. (Bot. J.), Kiïv 1951 : **8** : No. 3 : 3–14. [Ukrainian].

Cases of defective endosperm or embryo development resulting in empty seed in the variety Bogatyrj [Hero] are described.

1046 Kozlov, F. I.
(Directed training of buckwheat by sowing in late autumn).
Selekcija i Semenovodstvo (Breeding & Seed-growing) 1953 : No. 5 : 70–71. [Russian].

The 1000 seed weight and resistance to diseases, including *Peronospora*, of a new variety Gibridnaja [Hybrid], from Althausen 11 x Kaduiskaja, were improved when the seed was sown in late autumn for several generations.

OATS

1047 Frey, K. J. & Baten, W. D.
Optimum plot size for oat yield tests.
Agron. J. 1953 : **45** : 502–04.

Utilizing data from a uniformity trial of the oat variety CI 5298, the authors found that the optimum plot size for yield trials was 8′ long and 4 rows wide, the 2 central rows being harvested for yield. The number of replications necessary to obtain a precision such that the standard error of the varietal mean would be 3% of the experiment mean was calculated as 5 when the coefficients of variability were used for the computation, and as 9 when cost functions were used.

1048 Huttunen, E.
Sisukaura. (**Sisu oats**).
Siemenjulk. Hankkijan KasvinjalosLaitos Tammisto 1950 : 121–26.
[also in Maatalous ja Koetoim. 1950 : **4** : 60–67].

An account is given of the characteristics and behaviour of Sisu [Courage] oats, originating from the cross Våsa (= White Banner) x the Tammisto strain 02272, and marketed in 1948. Some comparative data are given of its performance in field trials over 9 years, relative to that of Kultasade II [Golden Rain II]. Sisu shows a higher yield than this variety, is drought resisting, and of good quality, with relatively nonlodging straw, and is suited particularly to cultivation in south and southwest Finland.

1049 Åkerman, Å.
Svalöfs Blendahavre. (**Svalöf Blenda oat**).
Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1952 : 2–3.

Further particulars are given of the performance of this Swedish oat since its release in 1950 (cf. *PBA*, Vol. XXI, Abst. 255).

1050 Holmgren, O.
Svalöfs Guldregnshavre III. (K 01452). [**Svalöf Golden Rain III oat. (K 01452)**].
Sverig. Utsädesfören. Tidskr. 1953 : **63** : 205–09.

Particulars are given of the origin of this new oat, the breeding of which began at Kalmar in 1941 with a hybrid selection from a Svalöf cross, Lochows Gelbhavre [Lochow's Yellow oat] x Seger [Victory]. Improvement of the grain quality followed crossing with Guldregnshavre II in 1925; and, by subsequent selection after five generations, the highly constant line 01450 was obtained, from which, after further selection at Kalmar and Svalöf, line 01452 was produced and later released to the German market under the name Guldregn III. It is not regarded as sufficiently superior to Guldregn II to warrant its sale in Sweden.
Guldregn III has a short, fine straw, the yield of which is lower than that of Guldregn II; it ripens one day earlier than the latter variety and shows good resistance to frit fly larvae, its grain is larger and its husk percentage lower.

1051 Valle, O.
Kauran soveltuvuus leikkuupuintiin. (**The suitability of oats for combine harvesting**).
Maatalous ja Koetoim. 1953 : No. 7 : 48–60.

Comparative data are given for the results of combine harvesting of the oat varieties Sisu [Courage], Eho [Graceful] and Orion III, with regard to their moisture content, germinability, efficiency of threshing and proportion of husks.

1052 Kelly, A. F.
New spring oat varieties.
J. Inst. Corn Merch. 1953 : **4** : p. 84.

Four new varieties of spring oats in Britain are described. Blenda and Sun II, both selections from the cross Star x Eagle, have comparatively short straw and good resistance to lodging. Yield and quality of grain are good. Blenda is slightly superior to Sun II.
Maldwyn, from the cross Victory x Radnor Sprig, was bred at the Welsh Plant Breeding Station, Aberystwyth. It gives a consistently good yield over a wide range of conditions, and is considered a safe variety where conditions for growth are not too favourable.
Milford, from the cross S 172 x Victory, is notable for its excellent resistance to lodging. Grain quality and yield are good, and under fertile conditions Milford is likely to give the best results.

1053 Turner, E. M.
The nature of the resistance of oats to the take-all fungus.
J. exp. Bot. 1953 : **4** : 264–71.

The reaction of two varieties of the take-all fungus, *Ophiobolus graminis* and *O. graminis* var. *avenae* to expressed sap from oat seedlings indicated that the sap contained a substance toxic to the former but not to the latter variety. It is suggested that the toxin, whose chemical properties have been investigated, is associated with resistance.

1054 Miczyński, K.
Studia nad wrażliwością odmian owsa na głownię przy sztucznym zakażeniu. **(Studies on the susceptibility of oat varieties when artificially inoculated by smut).**
Roczn. Nauk rol. 1952 : Ser. A : **66** : No. 1 : 129–50.

In a first investigation, the aims were to study the degree of susceptibility of 72 oat varieties to *Ustilago avenae* and also to discover whether populations of smut from two localities, Dublany and Puławy, could be distinguished as physiological races.
High or complete resistance to both populations of *U. avenae* were shown by the American varieties, Navarro, Markton, Black Mesdag and Fulghum and also by the varieties Tulunskiĭ and Harkovskiĭ. The varieties Puławy Średnio-Rychły [Medium-Early Puławy], Najwcześniejszy Niemierczański [Earliest Niemierczański], Rychlik Oberek [Early Dance], Żołty Udycz [Yellow Udycz], Legacy, Lischower Früh [Early Lischower], Gopher, Richland and Noire d'Etampes [Etampes Black] were resistant to the Dublany population, but were severely infected by that from Puławy. Complete resistance to both populations was confirmed in three local Polish varieties from districts around Nowy Targ and a specimen of *Avena strigosa* was also resistant.
In a second investigation the percentage of infection caused by each of 18 samples of *U. avenae* from different localities and by one sample of *U. laevis* was determined artificially by inoculating a standard series of 11 varieties of oats. From these varieties seven were then chosen for the investigation of the virulence of the 19 individual samples of smut; a variety showing less than 10% of infected plants was considered resistant and varieties showing over 10% were judged susceptible. On this basis, the samples of *U. avenae* were arranged in eight groups of races denoted by the letters A to H and characterized by various degrees of virulence in regard to the standard varieties. The six most virulent populations, which comprise group A, attacked all the standard varieties except Black Mesdag. The four populations of group H, though the least virulent, nevertheless strongly attacked Eckendorfer Früh [Early Eckendorf]. The sample of *U. laevis* attacked Black Mesdag, which was unaffected by *U. avenae*. High, though not complete, resistance was shown by Markton to all the samples of smut used, and by Fulghum to several of the samples of *U. avenae*.

1055 Goto, S.
Biotypes within race 7 of *Puccinia graminis avenae*.
Phytopathology 1953 : **43** : 472–73. (Abst.).

Biotypes of race 7 have been identified by means of the reactions of the oat varieties Jostrain, Victoria-Hajira-Banner and CI 6537 (Clinton x Ukraine) under different conditions of light intensity and temperature (70–75° and 80–85° F).

1056 Simons, M. D.
The relationship of temperature and stage of growth to the crown rust reaction of certain varieties of oats.
Phytopathology 1953 : **43** : p. 484. (Abst.).

Eleven varieties were inoculated at four stages of growth with race 205 of *Puccinia coronata* var. *avenae* at 15° and 25° C. In most varieties resistance was greater at the lower temperature and in the later stages of growth. Santa Fe, Bondvic, Clintafe and Clintland were highly resistant at both temperatures and all four stages of growth. Mo. 0–205 (cf. *PBA*, Vol. XXII, Abst. 314), completely susceptible in the seedling stage, showed a high degree of mature plant resistance at both temperatures. The resistance of Landhafer broke down at 25° C at all stages of growth.

1057 Finkner, V. C.
Inheritance of susceptibility to *Helminthosporium victoriae* in crosses involving Victoria and other crown rust resistant oat varieties.
Agron. J. 1953 : **45** : 404–06.

The Victoria type of resistance to crown rust is associated with susceptibility to *H. victoriae*. The dominance of this susceptibility was not altered when the factor for crown rust resistance in Victoria was combined, by appropriate crosses, with nonallelic factors for crown rust resistance, either epistatic or hypostatic to the Victoria factor. No indication was obtained of broken linkage between the Victoria type of crown rust resistance and susceptibility to *H. victoriae*. Anthony Bond x Boone contained an allele which was recessive to the Victoria factor.

1058 Moseman, J. G., Gore, U. R. & McKinney, H. H.
Reaction of winter oat varieties and selections to soil-borne viruses in southeastern United States.
Plant Dis. Reptr. 1953 : **37** : 226–29. (Mimeographed).

Many of the varieties and selections tested

showed resistance to the mosaic viruses. The varieties recommended in the states where the viruses are known to be present are resistant; as long as only resistant varieties are cultivated it is unlikely that mosaic will become important.

1059 Tennberg, F.
Eho-, Sisu- ja Sol II-kaurat paikalliskokeissa. (**Eho, Sisu and Sol II oats in local tests**).
Siemenjulk. Hankkijan KasvinjalosLaitos Tammisto 1950 : 136–46.

An account is given of tests in which the newly introduced oat varieties Eho [Graceful], Sisu [Courage] and the Swedish Sol II are compared with Kultasade II [Golden Rain II], the most commonly cultivated oat variety in Finland hitherto. The varieties are compared with respect to yield, earliness, straw qualities and environmental preferences.
Eho, intended for use in central Finland, has proved to be equal in yield to Kultasade II, and similarly unexacting regarding conditions of growth. It ripens 2–3 days earlier than the standard and has distinctly stiffer straw. Sisu is the highest yielding of the varieties, has the stiffest straw, and shows the most promising reaction to fertilizers. It ripens at about the same time as Kultasade II. Sol II shows a higher yield than the standard, particularly under poorer growing conditions, and has considerably stronger straw. It ripens 2–3 days later.

RYE

1060 Müntzing, A. & Lima-de-Faria, A.
Pairing and transmission of a small accessory iso-chromosome in rye.
Chromosoma 1953 : **6** : 142–48.

Small derivatives of the standard type of B chromosome in rye were shown to be isochromosomes because (i) both arms have the same chromomere structure, (ii) the two arms of the same chromosome frequently pair with each other and (iii) the four arms of the bivalent occasionally formed at pachytene by two isochromosomes may exchange partners with each other, forming a pseudotetravalent. The small isofragment is derived from the standard fragment.
In crosses between normal rye and plants with an isofragment the unpaired extra chromosome is eliminated in the great majority of cases. In crosses and back crosses of plants containing one or two isofragments, irregularities in pairing at meiosis usually lead to a decrease in the number of fragments in the progeny.

1061 Diedler-Heinersdorf, C.
Mähdrescher—Tetraroggen. (**Combine harvester—tetraploid rye**).
Mitt. dtsch. LandwGes. 1954 : **69** : 7–8.

The advantages of tetraploid over diploid rye are discussed. Tetraploid rye is well suited to combine harvesting, is resistant to lodging and does not shed its grain. It also gives a considerably higher yield of straw.

1062 Vřeský, F.
Šlechtitelská hodnota větevnatých klasů ozimého žita, získaných vydatnější výživou. (**The breeding value of branched ears in winter rye obtained by increased doses of nutrients**).
Sborn. čsl. Acad. Zeměd. 1953 : **26** : 371–86.

Mineral or organic nutrients resulted in an increase in the number of branched ears formed by certain strains of winter rye that already had a tendency to grow branched ears. This increase was not, however, transmitted to later generations, and disappeared once the favourable conditions causing it were removed.

1063 Plaut, M. & Ventura, J.
Varieties of summer rye in Israel.
World Crops 1953 : **5** : 453–54.

An account is given of trials of spring and winter rye varieties, carried out during the season 1949–50 on light clay at Rehovot and at Kubeiba on heavy loam. No clear dividing line could be drawn between spring and winter varieties; the spring ryes Petkus from France and French from the United States, however, gave outstandingly good results and showed suitability for Israel conditions.

MAIZE

1064 **Co-operative hybrid maize tests in European and Mediterranean countries—1951.**
Develop. Pap. FAO UN, Rome 1953 : No. 35 : Pp. 145.

A full report is given of the results of trials of American and Canadian hybrids and of local hybrids and open-pollinated varieties in 21 countries.

1065 B.
Die Einführung von Mais-Hybridsorten. (**The introduction of hybrid maize varieties**).
Schweiz. landw. Z. 1953 : **81** : 1170–71.

At a conference held at the Federal Agricultural Experiment Station, Zürich-Oerlikon, on 29 September 1953, the hybrid maize varieties

Ohio M34, Wisconsin 270, Wisconsin 255 and Wisconsin 240 were recommended for cultivation under Swiss conditions.

1066 JOSEPHSON, L. M.
Use of second generation "top-cross" hybrid seed.
Fmg in S. Afr. 1953 : **28** : p. 322.

In a trial at the Potchefstroom College of Agriculture, Transvaal, the commercial top-cross maize variety distributed by the Maize Control Board outyielded open-pollinated varieties by 49·2%; F_2 seed of the top cross outyielded the ordinary varieties by 18·0%.

1067 FINDLEY, W. R. (JUN.) & SPRAGUE, G. F.
Report of the cooperative uniform comparisons of corn hybrids 1952.
U.S. Dep. Agric. 1953 : Pp. 43. (Mimeographed).

A summary of the results of trials of the following maize hybrids is presented: (1) single crosses belonging to the Wisconsin 355 and Ohio K 24 classes of maturity, and yellow top-crosses and white three-way crosses of the Illinois 448 class; and (2) single crosses belonging to the maturity classes of Wisconsin 412, Ohio M 15 and US 13. The tests of group (1) were carried out in the north central states, those of group (2) in the northeastern region. Predictions are given for the performance of double crosses.

1068 **Better hybrids for Dixie.**
Sth. Seedsman 1953 : **16** : No. 11 : 17, 57, 60–61.

The following are listed as the highest yielding maize hybrids in Georgia: Ga. 101; Ga. 103; US 282; Dixie 17, 18, 22 and 23; Funk's G–714A, 711 and 790; NC 27; Tenn. 10; PAG 631; McCurdy; Wood's; and Coker 811.
Data on other maize hybrids suited to the South of the USA are presented, together with lists of varieties recommended by the different states.

1069 **1952 yield trials with corn hybrids in Missouri.**
Bull. Mo. agric. Exp. Sta. 1953 : No. 592 : Pp. 24.

Tables are given summarizing the results of yield trials of maize hybrids at several centres in Missouri during 1952, together with the average performance of hybrids tested during the inclusive period 1948–52. In tests of suitability for mechanical picking, considerable differences between hybrids were apparent. The chief factors affecting such suitability are probably moisture content, amount of stalk lodging and tendency to drop ears.

1070 **Corn hybrids and varieties—1951.**
Bull. Miss agric. Exp. Sta. 1952 : No. 487 : Pp. 15.

The results of the 1951 trials of maize hybrids and varieties conducted at several centres in Mississippi are summarized.

1071 CAGAMPANG, F. V.
Development of synthetic varieties from inbred lines of College Yellow Flint corn.
Philipp. Agric. 1952 : **56** : 19–26.

At the College of Agriculture, University of the Philippines, three synthetics, I, II and III, were developed from all possible single crosses involving, respectively, four S_3 inbreds with high, medium and low combining ability. The twelve inbreds used were derived from College Yellow Flint. The F_2 synthetics I and II both outyielded III and the original variety; synthetic I was superior in yield to II, but less uniform. Testing of the F_3, F_4 and F_5 generations is regarded as essential.

1072 PANELLA, A.
Esperienze sul consumo idrico di alcuni mais ibridi americani in confronto col *Nostrale Umbro.* (**Experiments on water consumption of some American maize hybrids in comparison with Nostrale Umbro**).
Ital. agric. 1953 : **90** : 524–26.

Observations on the development of four American hybrids, with the early-maturing local Umbrian variety as control, showed that the hybrid US 13 was over a fortnight later than the local maize in flowering time but only about 10 days later in maturity. The total dry matter produced was maximum in US 13 and minimum in the control. The water consumption was roughly the same in all varieties up to the time of grain setting, but in the period of ripening US 13 and other late-maturing hybrids used more water than the earlier varieties such as Wisconsin 255 and Umbrian.

1073 BLAND, B. F.
Maize as a silage crop in eastern England.
Agriculture, Lond. 1953 : **60** : 311–14.

The results of trials of old varieties and some American hybrids, carried out during the past ten years at the Norfolk Agricultural Station, Sprowston, indicated that, provided an early maturing variety is chosen and a satisfactorily high plant population can be secured, maize has promise as a silage crop for eastern England.

1074 Matzinger, D. F.
Comparison of three types of testers for the evaluation of inbred lines of corn.
Agron. J. 1953 : **45** : 493–95.

Eight tester inbreds were used as lines and in single and double crosses; a second series of inbreds constituted the lines to be evaluated. The estimates of the variance components for tester x line interaction were 17·22, 11·90 and 6·46 for line, single cross and double cross testers, respectively. Thus, as the genetic variation within the tester parent increased the tester x line interaction increased. This general relationship held for all the characters studied, except moisture percentage. The problem of choosing a suitable tester is discussed in relation to these estimates of the variance components for tester x line interaction.

1075 Koski, V. M. & Smith, J. H. C.
Chlorophyll formation in a mutant, white seedling-3.
Arch. Biochem. Biophys. 1951 : **34** : 189–95.

The maize mutant white seedling–3 (cf. *PBA*, Vol. VI, Abst. 878) was not characterized by a block of some step in the biosynthesis of chlorophyll but was unable to preserve chlorophyll once it had been formed.

1076 Teas, H. J. & Teas, A. N.
Heritable characters in maize. Description and linkage of brittle endosperm-2.
J. Hered. 1953 : **44** : 156–58.

The factor for brittle endosperm–2 has been located in the short arm of chromosome 4 and is closely linked with the factor for sugary endosperm–1. The mutant containing brittle endosperm–2 is reported to possess a higher fat, protein, reducing sugar and sucrose content than normal.

1077 Mazoti, L. B.
Variación heredable espontánea en maíz. (**A spontaneous hereditary variation in maize**).
Idia 1953 : No. 62 : p. 22.

A mutation displaying white endosperm (*y*), albino plant (*w*) and viviparous embryo (*vp*) simultaneously is described. Occasional crossing over between *yw* and *vp* showed that the effect is not due to a pleiotropic gene and it is ascribed to a small deficiency.

1078 Adams, J. D.
Observing pollen tubes within the styles of *Zea mays* L.
Stain Tech. 1953 : **28** : 295–98.

A method of making squash preparations showing the course of the pollen tubes from the exposed stigmatic surface to the base of the style is described. The method was developed in connexion with a study of pollen tubes containing different alleles of the locus ga_1. Instructions are given not only for slide preparation but also for collecting and storing the ears. The macerated silks are mounted in lactophenol and the slides examined with a dark-field microscope.

1079 Andrew, R. H.
Short first internode in maize.
J. Hered. 1953 : **44** : 146–48.

A short first internode, thought to be controlled by a single recessive gene, *sfi*, was observed in the inbred line 5002 of sweet maize. It frequently results in the coleoptile being unable to emerge at normal planting depths in the field.

1080 Tonini, G.
L'attività fotosintetica in alcuni tipi di granoturco. (**Photosynthetic activity in some maize types**).
Ital. Agric. 1953 : **90** : 649–55.

A study of the leaf development of a number of maize types showed, among other things, that the active leaf surface at any given time is five times as large in late varieties as it is in the very early types; the photosynthetic activity is however roughly the same in both, so that the yielding ability of late types is invariably greater than that of early ones. It is suggested that breeders should aim at producing forms among the late types which have somewhat lower temperature requirements for germination and leaf production, so that they may replace the early types that must be grown at present in areas with a relatively short growing season.

1081 Rod, J. & Segetová, V.
Příspěvek k stanovení oplodňovací schopnosti pylu a blizen v závislosti na stáří květenství u kukuřice. (**Fertility studies of maize pollen and stigmas in relation to age of the inflorescences**).
Sborn. čsl. Acad. Zeměd. 1953 : **26** : 317–32.

The effects of overmaturity of pollen and stigmas of some varieties and hybrids of maize upon their fertility were investigated. It was found that 2–3 day old pollen was most viable and that it became sterile on the twelfth day after the emergence of the tassels. The stigmas were most receptive on the fourth to eighth day after emerging and became sterile when 20 days old.

1082 Nelson, O. E. (Jun.).
A genic substitute for isolation in hybrid corn seed production.
Econ. Bot. 1953 : **7** : 382–84.

The possible use of the gene Ga^8 for cross sterility as a means of preventing contamination in the production of seed and commercial crops of popcorn and also of maize with special types of kernel is discussed (cf. *PBA*, Vol. XXI, Abst. 1826, and Vol. XXII, Abst. 2681).

1083 Baten, W. D. & Brown, H. M.
A formula for approximating the proportion of barren corn stalks for each generation.
Quart. Bull. Mich. Agric. Exp. Sta. 1953 : **36** : 50–54.

Theoretical formulae are put forward to determine the inheritance of female sterility in maize. Under conditions of random mating, if the silks of a normal homozygous stalk are pollinated with pollen from a barren stalk the proportion of female-sterile plants will gradually approach zero with each succeeding generation. After 20 generations there will be less than 1% of barren stalks, and after 100 generations less than 0·03% of barren stalks.

1084 Laughnan, J. R.
The effect of the sh_2 factor on carbohydrate reserves in the mature endosperm of maize.
Genetics 1953 : **38** : 485–99.

The amounts of reducing sugars, sucrose, water-soluble polysaccharides and starch were determined in kernels with normal (*SuSh*), sugary (su_1Sh), shrunken ($Sush_2$) and sugary shrunken (su_1sh_2) phenotypes. The substitution of su_1 for *Su* was found to result in a decrease in the starch fraction, and to increase the percentage of total sugars to two to three times that in *SuSh* kernels. Water-soluble polysaccharides constituted over one-third of the dry weight of the su_1Sh kernels, whereas normal kernels had only 1% of these polysaccharides. Less starch was formed in $Sush_2$ kernels than in the normal or sugary types, but the fraction of total sugars was increased ten and four times compared with normal and sugary kernels, respectively; sucrose formation was chiefly responsible for these increases; the amount of water-soluble polysaccharides in the $Sush_2$ type was low. The trend of lower levels of starch and higher concentrations of sugar accompanying the substitution of su_1 or sh_2 for the normal allele was accentuated in su_1sh_2 kernels, which contained less than 10% of the normal amount of starch and possessed a sugar content approximately one-third of the dry weight, chiefly in the form of sucrose. The su_1Sh, $Sush_2$ and su_1sh_2 kernels exceed the normal type in fat content; this increase is attributed to greater accumulation of carbohydrates which are precursors of lipids. It is suggested that the action of *Su* occurs after the synthesis of water-soluble polysaccharides, controlling a step in the formation of starch from these lower polymers. The gene *Sh* probably acts prior to *Su* in starch synthesis. The possible practical value of sh_2 in sweet corn production is discussed.

1085 Antoniani, C., Fenaroli, L., Federico, L., Feresini, P. & Monzini, A.
Ricerche sulla composizione chimica e sul valore nutritivo di diversi tipi di mais coltivati in Italia. Nota preliminare.
(**Investigations on the chemical composition and the nutritive value of different types of maize grown in Italy. Preliminary note**).
Ann. Sper. agr. 1953 : **7** : 1807–22.

Following the drive since 1947 to promote hybrid maize cultivation in Italy, the above investigations, in which yellow maize was compared with white, open-pollinated with hybrid, and flint or semiflint with dent, were undertaken. The analytical results here set out will be discussed in a subsequent report.

1086 Kramer, A.
(**Chemical composition of some maize varieties and hybrids**).
Selekcija i Semenovodstvo (Breeding & Seed-growing) 1953 : No. 5 : 55–57. [Russian].

Results of chemical analyses of many varieties and hybrids originating from Northern Osetia, Kabarda, Krasnodar, Poltava, Stavropolj and Grozno are discussed. Several hybrids with good yields and high starch content are listed. They include VIR* 37, VIR 42, Dnepr 15 and Dnepr 5, all of which produce white kernels, Krasnodar 1/49, which maintains heterosis in the F_2 and F_3, and hybrid VIR 66 x Groznenskaja Belaja Zubovidnaja [Grozno White Dent], which combines high starch and low protein content.

1087 Gorter, G. J. M. A.
Studies on the spread and control of the streak disease of maize.
Sci. Bull. Un. S. Afr. 1953 : No. 341 : Pp. 20.

The streak resistant hybrid Yellow Peruvian x

* Vsesojuznyĭ Institut Rastenievodstva [USSR Institute of Plant Industry].

Hickory King was crossed with susceptible but high-yielding white dent varieties. The more promising crosses combined tolerance of the disease with a yielding capacity equal to that of the susceptible parents. The wheat varieties Ceres, Marquis, Renown, Regent, Reward and *Triticum turgidum* are immune to the disease.

1088 Jeffreys, M. D. W.
Pre-Columbian maize in Africa.
Nature, Lond. 1953 : **172** : 965–66.

Archeological remains of pots decorated by rolling a maize cob over the wet clay have recently been found in the Yoruba territory, Nigeria. From the local traditions, tribal names for maize and historical evidence, the author concludes that maize existed in West Africa long before the arrival of the first Europeans on the Yoruba coast or the birth of Columbus, and reached the Yoruba region by land from the north-east. In connexion with the problem of how maize was introduced in Africa, the writer states that he has accumulated sufficient data to provide evidence of early Arab-Negro contacts with the Americas, beginning about 900 AD.

1089 Hooker, A. L.
Correlation of resistance to eight *Pythium* species in seedling corn.
Phytopathology 1953 : **43** : p. 476. (Abst.).

Resistance to eight species of *Pythium* causing seed decay and seedling root rot was studied in 45 diploid lines of maize derived from monoploids and in three synthetics. A list is given of the positive correlation coefficients obtained between the reactions of these strains to artificial inoculations of the different species, figures for pairs of species being provided. These correlations and also differences in reaction shown by the individual strains were highly significant.

1090 Wernham, C. C.
The mass production of blight-resistant corn.
Plant Dis. Reptr. 1953 : **37** : 138–41. (Mimeographed).

At the Pennsylvania Agricultural Experiment Station, data have been obtained showing that, in breeding maize for resistance to leaf blight (*Helminthosporium turcicum*), inbreds with intermediate resistance or complete susceptibility may be used in crosses with lines possessing a higher degree of resistance. Crosses of the type (R x S)R^1 or (R x S)R produce a larger number of hybrids with a desirable degree of resistance than R x S crosses selfed. The parents resistant to *H. turcicum* were also resistant to *H. maydis*.

BARLEY

1091 Mariota-Trías, F.
A study of the effect of six qualitative character pairs on yield and component characters in the F_2 of a cross between two varieties of barley.
J. Agric. Univ. PR 1947 : **31** : 227–47.

Investigations were carried out on the relationship between six qualitative pairs of factors and four quantitative characters in the cross between the varieties Nigrillaxum (*Hordeum distichon*) and Brachytic-*chlorina* (*H. vulgare*) at the Minnesota Agricultural Experiment Station. The qualitative and monogenically determined character pairs studied were: two-rowed *vs.* six-rowed spike (*Vv*); black *vs.* white glumes (*Bb*); covered *vs.* naked caryopsis (*Nn*); hooded *vs.* awned lemma (*Kk*); normal *vs.* brachytic growth (*Brbr*); and green *vs.* chlorotic seedlings (*Fcfc*). Linkage was detected between *Br* and *Fc*, and between *N* and *K*. The four quantitative characters investigated were weight per seed, number of spikes per plant, number of seeds per spike and yield per plant.

The relationships between the quantitative characters and the possible genotypes for each of the above factor pairs were determined, and in some cases significant associations were found. Genotype *vv*, for instance, was higher in yield than *VV*, while *kk* was associated with higher yield than either *Kk* or *KK*. Compared with *Vv* or *VV*, *vv* had a higher number of seeds per spike and lower weight per seed. Genotype *kk* was associated with a higher weight per seed than *KK*, and higher number of grains per spike than either *Kk* or *KK*. Such associations are explained in terms of the known morphological or physiological effects of the gene pairs. The effects of the different genotypes for a given gene pair, when considered in combination with nonallelic genotypes, were also analysed. *V vs. v* and *K vs. k* were fairly consistent in their effects in all genotypes. In the case of other gene pairs, certain genotypes showed specific interactions with nonallelic genotypes; for example, the yield of the genotype *kk* was depressed in the presence of *N* but that of *KK* was increased. The linkage ($46{\cdot}1 \pm 1{\cdot}71$) between *K* and *N* was possibly caused by a translocation.

1092 Fiuzat, Y. & Atkins, R. E.
Genetic and environmental variability in segregating barley populations.
Agron. J. 1953 : **45** : 414–20.

Using the F_1 and F_2 populations of Moore x

Peatland-Mariout and Mars x Peatland-Mariout, and of the four parental barleys, the genetic and environmental variability of date of heading, date of maturity, plant height, number of heads, grain yield and kernel weight was evaluated at the Iowa Agricultural Experiment Station. Correlation coefficients between the different characters were calculated. It was concluded that individual plant selection in the F_2 should be highly effective for date of heading, and to some extent for plant height. Date of heading appeared to be controlled by a single major gene pair, possibly the same in both crosses, and by modifiers. The data further suggested that dates of heading and maturity were controlled by the same or closely associated genes. Since the coefficient of variation for date of maturity was considerably higher than for date of heading, it was concluded that date of heading was a more reliable indication of earliness. Selection for number of heads, grain yield and kernel weight should be based on progeny tests in later generations rather than on spaced F_2 plants.

1093 Caldecott, R. S. & Smith, L.
A study of X-ray-induced chromosomal aberrations in barley.
Cytologia, Tokyo 1952 : **17** : 224–42.

Investigations have been carried out on the chromosomal aberrations occurring in root-tip mitosis and in microsporogenesis in plants of the barley Himalaya raised from seeds subjected to dosages of 0–32,000 r. It was concluded that the chromosomes in the resting embryo usually responded to X irradiation as though they were monopartite, since the aberrations induced were preponderantly derived from chromosome breaks. The data further indicated that reunion occurred before the chromosomes became effectively bipartite, the chief evidence in this connexion being the fact that most bridges at anaphase in the root tip cells were paired. Union of two acentric chromatinic fragments took place infrequently, if at all, suggesting the important part played by the centromere in the union of broken ends. The acentrics were apparently able to undergo one division, but did not persist beyond the subsequent resting stage. A centric fragment evidently became attached to an acentric or another centric fragment with similar frequency. Observations of meiosis in 3509 spikes showed that the most common aberration was a ring of four chromosomes, the result of simple reciprocal translocation. Other aberrations, in descending order of frequency, consisted of two rings of four, pseudoisochromosomes involving translocations between opposite arms of homologous chromosomes, rings of six, and true isochromosomes. Data on the position of aberrations within the spikes provided evidence that all the microsporocytes in a single spike usually arose from a single cell in the dormant embryo.

1094 Mikaelsen, K. & Halvorsen, H.
Experiments on the respiration of X-irradiated barley seeds.
Physiol. Plant. 1953 : **6** : 873–79.

Dry seeds of the barleys Jotun and Maja were treated with heavy doses of X rays. Germination proper was unaffected. Doses of 5000–15000 r. had no influence upon the initial rate of respiration, but after 4–5 days of germination at 20° C, irradiated seeds showed a marked reduction in respiration. The nature of the effect of X irradiation upon respiration is discussed in relation to observations on cytology and growth. At the premitotic stage, the number of physiologically active cells was unimpaired. All the embryonic cells were able to complete the first mitosis, in spite of delay in division, but chromosome aberrations causing elimination of nuclear material reduced the number of daughter nuclei able to divide. The number of cells with chromosome aberrations was linearly related to the doses in the range 5000–15,000 r. The lowered respiration of irradiated seeds could not however be simply related to the reduced number of actively growing cells, since the reduced rate of respiration remained at a constant level when the dose was increased from 5000 to 15,000 r. Jotun was more radiosensitive than Maja, as shown by data on both respiration and seedling growth.

1095 Yamamoto, T.
(Studies on sterility in barley. I. On the mechanism responsible for the formation of sterile grains).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 80–84. [Japanese].

Sterility in the 2-rowed variety Moravia, when grown in Hokkaido, was found to be principally due to imperfect dehiscence of the anthers, an effect attributed to wet weather at anthesis.

1096 Takahashi, R., Yamamoto, J. & Maruhashi, W.
(Studies on the classification and the distribution of barley varieties. IV. Linkage relations and the origin of the semibrachytic type of ear).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 167–73. [Japanese].

This paper is a Japanese version of the article summarized in *PBA*, Vol. XXII, Abst. 2704.

1097 KONZAK, C. F.
The third outer glume character in barley.
J. Hered. 1953 : **44** : 103–04.
At Cornell University, Ithaca, NY, linkage data have been obtained showing that a mutant of the variety Valki, with a bract covering the ordinary outer glumes, depends upon a gene identical with that reported by Ivanova for the same character in an Afghan barley (cf. *PBA*, Vol. VIII, Abst. 851); the gene has been designated *trd*.

1098 MATHON, C.-C.
Tératologie et morphologie expérimentales sur la base de la modification des conditions écologiques habituelles du développement. Première note. (**Experimental teratology and morphology based on modification of the usual ecological conditions of development. Note I**).
Bull. Soc. Bot. Fr. 1953 : **100** : 165–68.
By summer sowing of varieties of *Hordeum vulgare* and *H. trifurcatum*, various anomalies of the inflorescence, including branched ears and the formation of florets and spikelets with long pedicels were obtained. The writer regards these modifications as due to the disturbing effects of the sowing time upon the normal relationship between (1) growth and (2) phasic development of the upper and lower portions of the ear.

1099 PREECE, I. A. & AITKEN, R. A.
Non-starchy polysaccharides of cereal grains. IV. Cellulase activity and autolysis relationships of some malting barleys.
J. Inst. Brew. 1953 : **59** : 453–61.
An analysis of malting samples of several barley varieties showed that cellulase activity is significantly correlated with the yield of barley gum obtainable after a 30-minute period of autolysis; this relationship, however, is only in part direct since the yield also depends upon the dissolution of readily-soluble gum. Varietal differences in range of cellulase activity were noted. The dissolution of the products of enzymolysis and the parallel dissolution of readily-soluble gum depend upon the ease of penetration by the steeping solvent. The penetration factor varies from one sample to another; this variation may prove of significance in the early stages of malting. The samples also differed with respect to autolytic pattern but the data did not suggest that any particular pattern was necessarily a varietal characteristic.

1100 VAN DURME, J.
L'amélioration de nos orges. (**Improvement of our barleys**).
Fermentatio 1951 : 81–89; 126–40.
An historical review is given of progress made in breeding improved malting barleys in England, Czechoslovakia, Germany, Scandinavia, the USA, France and Belgium.

1101 FRÖIER, K.
Maltkorn och foderkorn. (**Malting barley and fodder barley**).
Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1952 : 3–6.
This paper deals mainly with the requirements of the Swedish brewing industry with regard to malting barleys. After laboratory analyses and malting tests, Heimdal, bred from the cross Peragis x Maja, was approved by the Stockholm Breweries Co. as a valuable malting variety characterized by low protein content, desirable protein constituents and high extract.

1102 Una nueva variedad de cebada forrajera "Guatraché Araucana M.A.G." difundirá la Estación Experimental Eva Perón. (**The Eva Perón Experimental Station will distribute a new variety of forage barley, Guatraché Araucana MAG**).
Idia 1953 : No. 62 : p. 21.
The variety is a hybrid between Finley and Vaughn Smooth and has exceeded other Argentine varieties in yields of both forage and grain; it is resistant to both loose and covered smut and to drought, frost, shedding and lodging and partially resistant to rusts and *Helminthosporium*.

1103 HASKETT, W. C. & MURPHY, H. C.
Relative susceptibility of barley varieties to *Pythium graminicola* Subr.
Phytopathology 1953 : **43** : p. 474. (Abst.).
In tests under greenhouse conditions, the barleys Montcalm, Pillsbury, Moore and Trebi showed most resistance to *P. graminicola*. The wet weight of the roots provided the most satisfactory indication of resistance.

1104 GREEN, G. J. & DICKSON, J. G.
Host-parasite relationships in *Septoria* leaf blotch of barley.
Phytopathology 1953 : **43** : p. 473. (Abst.).
Host penetration was predominantly stomatal in both susceptible and resistant barleys. The leaf cells of resistant varieties reacted quickly to the fungus, the first visible evidence of this

reaction being a safranin-staining fringe on the host cell walls in contact with the hyphae. Depressions in the protoplasts were then formed around the points of contact, and the walls thickened in the affected areas. Such cells died slowly and the hyphae also degenerated. Degree of varietal resistance appeared to be dependent on the intensity of this response.

1105 Mehta, P. R., Babu Singh & Mathur, S. C.
Varietal reaction to stripe disease of barley.
Sci. & Cult. 1953 : **19** : p. 152.

In tests of 21 varieties at Kanpur, Uttar Pradesh, K 12, CN 292 and 42/72 showed no stripe (*Helminthosporium gramineum*). K 12 has previously been found resistant to *Ustilago hordei* too. Variety 42/72 may prove useful in breeding for stripe resistance.

1106 Emmens, J. A., Kortenhorst, A. T., van Veldhuizen, H. & Wilten, W.
25 jaar brouwgerstverbouw in Nederland. **(Twenty-five years of malting-barley growing in the Netherlands).**
Meded. nat. Com. Brouwg. 1953 : No. 19 : Pp. 35.

This pamphlet, issued by the Netherlands National Committee for Malting Barley (NaCo-Brouw), outlines the history of the cultivation of malting barley in the Netherlands from the end of the middle ages up to the present day. The advances made since the establishment of NaCoBrouw in 1934 are mentioned and a list is given of Dutch and foreign varieties tested during the past 25 years.

MILLETS AND SORGHUMS

1107 Doggett, H.
The sorghums and sorghum improvement in Tanganyika.
E. Afr. Agric. J. 1953 : **18** : 155–59.

An account is given of sorghum breeding in Tanganyika, including selection and hybridization methods. Types most urgently required are early maturing varieties with grain that stores well; dwarf varieties suitable for combine harvesting; and varieties resistant to bird and weevil attack, and to infestation by witchweed.

1108 Roelofsen, B.
Sorghum en de mogelijkheden van dit gewas voor Indonesie. **(Sorghum and the possibilities of this crop for Indonesia).**
Landbouw, Bogor 1952 : **24** : 255–82.

After a description of the plant its history and phylogenetic classification are discussed, with detailed observations on the four groups, *Sorghum vulgare* var. *saccharatum*, var. *vulgaris*, var. *sudanensis* and var. *technicum*, and their respective value for Indonesian farming.

RICE

1109 Kanda, M.
(On the area, shape and number of replications required for plots in field experiments. I. On the case provided by experimental trials of rice varieties for yielding capacity).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 161–62. [Japanese].

The optimum plots were found to be 5 shaku long (1 shaku = ·994 feet) and 2 rows wide; only a small advantage was derived from more than 4 replications.

1110 Piacco, R.
Prove di rendimento di alcune razze. **(Yield tests of some varieties).**
Riso, Milano 1953 : **2** : No. 10 : 5–6.

The new rice variety R 253, sometimes referred to as Balillone, is a hybrid of P 6 x Americano 1600; in irrigated test plots in 1952 it exceeded Americano 1600 in yield, size of grain, earliness and standing capacity. It also proved superior to Balilla and Bersani.

1111 Matsuo, T.
(The history of rice variety improvement at the National Agricultural Experiment Station during the past 50 years).
Norinsho Noji Shikenjo Hokoku/Bull. Nat. Agric. Exp. Sta. 1948 : No. 63 : Pp. 28. [Japanese].

This general survey of rice breeding and genetical research at the above station deals with the following aspects: selection and hybridization work; breeding for resistance to diseases and pests, and for environmental adaptability; studies on vegetative period and reaction of varieties to $KClO_3$; introduction and testing of foreign varieties; the genetics of pigmentation, and of morphological and physiological characters; sterility; genome analysis in *Oryza*; and polyploidy.

1112 **Pyramid points up processes used to develop improved rice varieties.**
Rice J. 1953 : **56** : No. 9 : 35–36.

In a popular account of rice breeding at the Louisiana Rice Experiment Station, it is reported that the following new selections are being increased in case they should be required for foundation seed stock: a medium-grained type

from Rexoro-Purpleleaf x Magnolia, maturing slightly earlier than Rexoro or Magnolia, short-strawed and uniform in ripening; a selection from Cross 253 x Rexoro-Fortuna, whose grains are smaller than those of Magnolia but with less tendency to show a chalky streak; an early maturing selection from Bluebonnet x (Rexoro–Blue Rose x Rexoro), with long grain and very short straw; a selection from Rexoro-Purple leaf x Selection "G," similar to Rexoro in grain type and quality, and maturing at about the same time as Blue Rose; and a *Cercospora*-resistant selection obtained by crossing Rexoro and Blue Rose and back-crossing three times to Rexoro.

1113 **World catalogue of genetic stocks. Rice. Supplement No. 3.**
FAO UN, Rome 1953 : Pp. 28. (Mimeographed).

This issue contains contributions from Costa Rica, French Sudan (French West Africa), Tchad (French Equatorial Africa), India and Madagascar (cf. *PBA*, Vol. XXII, Abst. 2735).

1114 **World List of Rice Breeders.**
FAO UN 1953 : Pp. 6. (Mimeographed).

The names and official addresses of rice breeders are listed.

1115 Chan Choong, P. A.
Rice breeding in British Guiana.
News Lett. FAO Internat. Rice. Comm. 1953 : No. 7 : 9–11.

The history of rice breeding in British Guiana is discussed. A programme of intensive hybridization was begun in 1950 and single-crossing and back-crossing are being pursued.

1116 Love, H. H.
Methods used in making and testing a large number of rice selections in Thailand.
News Lett. FAO Internat. Rice Comm. 1953 : No. 7 : 1–6.

Methods employed in rice selection in Thailand are described. A three-year programme of varietal improvement was begun in 1950 and several promising lines have been selected.

1117 Sakai, K.
(Experimental studies on the significance of selection in plant breeding. I. To what extent can the yielding capacity of transplanted or directly sown rice be ascertained from isolated plants ?)
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 153–56. [Japanese].

The agronomic performance of eight varieties was compared under the three circumstances mentioned. Positive correlation was found between the isolated and transplanted plants in respect of incidence of lodging, heading date, plant height, number of panicles per hill, and grain yield per unit area, but not for weight of panicles per hill. Significant correlations between the isolated and directly sown plants were only found for incidence of lodging, heading date and plant height.

1118 Sakai, K.
(Experimental studies on the significance of selection in plant breeding. II. In what way is the yielding capacity of single rice plants influenced by neighbouring plants belonging to different varieties ?)
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 157–60. [Japanese].

Two rice varieties, the high yielding Eiko [Aureole] and the low yielding Murasakiine [Purple rice], were grown in pure stands and intermixed in various ways. Analysis of the yields of individual plants showed that the grain yield of single plants of Eiko increased when these were flanked by plants of Murasakiine, the increase being greater when Murasakiine was planted on 4 sides than on 2 only. A converse depression in yield was observed when single plants of Murasakiine were flanked by Eiko. This effect should be allowed for in selecting for yield in bulk plantations of segregating populations.

1119 Matsuo, T.
(Genecological studies on cultivated rice).
Nogyo Gijutsu Kenkyusho Hokoku/Bull. Nat. Inst. Agric. Sci. 1952 : No. 3 : Ser. D. : 1–29. [Japanese].

A comparative study of a world collection of rice varieties assembled at Konosu Experimental Station is reported. The characters investigated were plant morphology, type of grain, resistance to borer and to blast, tillering, tendency to lodge, response to fertilizer and to dense planting, and vegetative period. On the basis of grain type in combination with other characters, three main groups of varieties are distinguished, type A, characteristic of Japan, type B, from Java, and type C, from India. European and American varieties are principally of the B type, but Egyptian rices are of the A type. Both A and C types were cultivated at an early date in China. Japanese rice varieties appear to have developed from varieties of the

A type introduced at an early date from central China.

1120 Nishimura, Y. & Kurakami, H.
(Mutations in rice induced by X irradiation).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **2** : 65–71. [Japanese].

The soaked seeds of the four varieties Norin [Ministry of Agriculture and Forests] 8, 20, 25 and 29 were treated with *ca.* 20,000 r. Data are given on the distribution and inheritance of sterility in the X_1 and X_2 generations. Partial sterility in the X_2 was associated with the presence of multiple associations of 4 chromosomes, presumably due to reciprocal translocation in the preceding generation.
Mutations were observed in respect of heading period, culm length, density of panicles, glume colour and chlorophyll pigmentation.
Differences between the main culm and tillers in respect of reaction to X-ray treatment were noted.

1121 Luong Dinh Cua
Some observations on heading and blooming of diploid and autotetraploid rice (*Oryza sativa* L.).
Kyushu Daigaku Nogakubu Gakugei Zasshi/Sci. Bull. Fac. Agric. Kyushu Univ. 1951 : **13** : 1–5.

The heading period in artificially induced autotetraploids of three varieties was longer and less regular than in the corresponding diploids. The date of emergence of the first panicle was the same in the $2n$ and $4n$ forms of two varieties; the diploid of the third variety began heading two days earlier than the tetraploid. Time of blooming was studied in only one variety; the tetraploid began flowering two hours after the diploid had attained its maximum at 11.12 a.m., and finished blooming at approximately the same time.

1122 Durand, V.
Germination comparée du riz dans l'eau et dans l'air humide à différentes températures. **(Comparative germination of rice in water and humid air at different temperatures).**
CR Soc. Biol., Paris 1953 : **147** : 457–60.

The percentage germination of several Italian varieties of rice was compared under laboratory conditions. Increases in temperature beyond 27°C resulted in a rapid rise in rate and percentage of germination.
Each variety appears to depend upon different optimum conditions for germination. In some, but not all, varieties, the germination rate in water was not so high as that in humid air.

1123 Misra, G.
Photoperiodic behavior of medium-early varieties of rice.
Science 1953 : **118** : 552–53.

In investigations at the Department of Botany, Allahabad University, the medium-early varieties T 3, T 12 and T 21 showed delayed flowering when subjected to either short-day or long-day treatment.

1124 Takasugi, S. & Koyama, T.
(On the influence of combined treatment involving high temperature vernalization by means of an electrically heated seed bed and short day illumination on the growth and yield of some rice varieties).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 136–38. [Japanese].

Four varieties were studied, the treatment consisting of a preliminary 10 days seed-bed warming at 25–35°C, followed by 15 days under 10 and 8 hour photoperiods. Maturity was accelerated in all varieties by the treatment, especially in Norin 28 [Ministry of Agriculture and Forestry 28]. Yield increases also resulted in some instances.

1125 Misro, B., Misra, S. S. & Sastri, A. B.
Photoperiodic behaviour of certain varieties of rice.
Curr. Sci. 1953 : **22** : 272–73.

Experiments were carried out on the photoperiodic reactions of the varieties GEB 24, Baok, T 90 and T 1242 at the Central Rice Research Institute, Cuttack, India. The results suggested that a critical age, depending upon the variety, may exist before which no response to photoperiodic treatment is shown.

1126 Khan Sardar Khan, Jamal-ud-Din Ahmad & Muhammad Shafic
Utilization of photoperiodic response of some rice varieties for increasing production in the Punjab, Pakistan.
News Lett. FAO Internat. Rice Comm. 1953 : No. 7 : 16–18.

Data on varietal differences in photoperiodic response are presented.

1127 Sardar Khan, Jamal-ud-Din Ahmad & Muhammad Shafi
Blooming and anthesis of paddy in the Punjab.
Pakist. J. Sci. Res. 1953 : **5** : 10–15.

A report is given of investigations on blooming and anthesis in the early rice varieties 349–Johna

and S 19–RD and the late variety 370–Basmati, at the Rice Farm, Kala Shah Kaku, Punjab, Pakistan.

1128 VENKATASUBRAMANIAN, M. K.
Pollen and pollen-tube studies in rice.
Madras Agric. J. 1953 : **40** : 395–414.

Using the varietal collection at the Coimbatore Rice Breeding Station, investigations were carried out on the following: morphology, chemical composition, germination and longevity of pollen grains; germination of the pollen on the stigma; growth of pollen tubes in the style and ovary; nuclear behaviour; and pollen tube growth in polyploids compared with diploids, in starchy varieties compared with glutinous, and in cleistogamous rice.

Pollen viability quickly declined, but could be maintained for 24 hours at 12°C and 85% humidity. Fertilization occurred two hours after pollination. The vegetative nucleus of the pollen grain apparently disintegrated before germination. The tubes of a colchicine-induced $4n$ form of a cultivated variety were slower in growth than those of the corresponding diploid. The tubes of the tetraploid wild species *O. eichingheri*, however, had the same growth rate as those of the cultivated diploid. Diploid pollen germinated on $4n$ stigmas, but except for the pollen of *O. eichingheri*, $4n$ pollen burst when applied to $2n$ stigmas. Pollen tubes of starchy and glutinous rice had the same rate of growth on either type of pistil; no certation was detected. The behaviour of pollen from a cleistogamous variety was normal.

1129 SYAKUDO [SHAKUDO], K., TOMINAGA, M., KAWASE, T. & HAYASHI, K.
(Studies on quantitative inheritance. IX. A. Rice. b. Studies on the inheritance and quantitative function of the genes determining culm length. 2. On the quantitative function of 2 genes affecting culm length and 1 gene, D_1, responsible for dwarf habit).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **2** : 81–88. [Japanese].

Further to their studies on the pleiotropic effects of the gene pairs P_4p_4 and P_5p_5, controlling panicle length in the cross Nabeshima x an improved strain of Daikoku (cf. *PBA*, Vol. XXIII, Absts. 1224 and 2718), the authors analyse the relation between these genes and those responsible for culm length. The main loci affecting culm length are H_2h_2, H_3h_3 and D_1d_1, whose effects are multiplicative to the value of the gene complex C, defined in the authors' earlier papers. P_4p_4 and P_5p_5 also affect culm length; P_4 in fact, appears to be identical with H_2, but P_5 is not identical with H_3.

1130 MORIMOTO, I.
[Studies on the productive capacity of rice varieties in Japan (contd.). On stem length].
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 28–32. [Japanese].

The distribution of stem length among Japanese varieties follows a symmetrical unimodal curve. Stem length is positively correlated with yield per unit area, and temperature during the growing period, and negatively with the number of stems per unit area and heading period.

1131 MORIMOTO, I.
[On the productive capacity of rice varieties in Japan (contd.). On the yield per tan, and the yield per tan from the statistics of the metropolitan districts and prefectures].
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 67–72. [Japanese].

Further to his analysis of the yielding capacity of Japanese varieties (cf. Abst. 1130), data are presented on the regional yields per unit area and their correlation with other agronomic characters. Yield is positively correlated with stem length, number of stems per plant, number of stems per unit area, temperature and sunshine, and negatively with heading period and rainfall. Methods of calculating the expected performance of individual varieties at different localities, utilizing the data obtained by the author on the aggregate behaviour of all varieties, are discussed.

1132 KAWAHARA, E. & MOTOGI, T.
(Studies on the quality of upland rice. I. The degree of transparency of the hulled grain of glutinous rices and the relation between transparency and various other characters of the hulled grain).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 33–36. [Japanese].

The proportion of translucent to opaque grains varied between different strains of Tohoku glutinous rice. In some lines, the translucent grains were lighter in weight than the opaque grains; in other lines there was no difference. With some exceptions, opaque grains stained more deeply with I_2 + KI.

1133 Jodon, N. E.
Growing period of leading rice varieties when sown on different dates.
Rice J. 1953 : **56** : No. 9 : 8–10, 12–13.

Experiments have been carried out on the behaviour of Zenith, Magnolia, Bluebonnet and Rexoro when grown at 26 or 27 different dates of sowing in Louisiana during the period 1941–51. Data are given on dates of heading and ripening and duration of the growing period, and are discussed in relation to day length.

1134 Tanaka, M.
(The resistance to cold water of the principal rice varieties and lines of the Tohoku region. I. The relation between resistance to cold water and morphological characteristics).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 73–76. [Japanese].

Considerable varietal differences in resistance to the deleterious effects of cold water irrigation have been noted in Tohoku varieties. Resistance is correlated with glutinous grains, awning, pigmentation of the glume, heavy ears and early maturity.

1135 Kondo, Y.
(Physiological studies on resistance to damage by low temperatures in rice varieties).
Nogyo Gijutsu Kenkyusho Hokoku/Bull. Nat. Inst. Agric. Sci. 1952 : No. 3 : Ser. D. : 113–28. [Japanese].

An exhaustive study is presented of the various types of damage to rice resulting from low temperature and of varietal differences in this respect. The relative sensitivity of varieties to low temperature at the stages of formation of the primordia, reproductive cell formation and anthesis is not necessarily the same. A general correspondence was observed, however, between resistance to low temperature at the time of reproductive cell formation and resistance to prolonged irrigation with cool water. Late planting brings about a danger of damage to the ripening grain by low temperatures, and a general correspondence was noted between varietal resistance to this type of injury and the other types of damage by low temperature already mentioned.
The power to withstand low temperature and resistance to blast are inherited independently, so that breeding for combined resistance to these two conditions should be possible.

1136 Minabe, M.
(Analytical studies of drought damage in rice. II. On the characteristics of the underground parts).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 85–92. [Japanese].

A comparative study of 12 Japanese varieties revealed correlations between drought resistance, on the one hand, and root number, total root length and root depth, on the other (cf. *PBA*, Vol. XXI, Abst. 1953).

1137 Nagamatsu, T. & Ishikawa, H.
Studies on the geographical differentiation of cultivated rice. VI. Variation in lodging and its geographical distribution.
Kyushu Daigaku Nogakubu Gakugei Zasshi/Sci. Bull. Fac. Agric. Kyushu Univ. 1951 : **13** : 11–13. [Japanese].

Observations on lodging are reported in respect of the world collection of rices maintained at the Kukuoka experimental station of Kyushu University. The most resistant varieties came from regions at high latitudes, such as Japan, Manchuria and Italy.

1138 Ishikawa, E. & Kariya, K.
(The efficacy of individual selection in the F_2 generation after late transplantation into highly fertile conditions when breeding for disease resistance).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **2** : 72–74. [Japanese].

Families derived from selected plants in the F_2 and later generations of the rice cross Norin 18 [Ministry of Agriculture and Forests 18] x Norin 29 were compared; the selection criteria were blast resistance and superiority in other agronomic characters. It was found that selection for blast resistance was most effective in the F_2 while the other agronomic characters were best dealt with in the later generations.

1139 Padmanabhan, S. Y.
Effect of nitrogenous fertilization on the incidence of "blast" on rice varieties.
Curr. Sci. 1953 : **22** : 271–72.

The nine varieties studied at the Central Rice Research Institute, Cuttack, India, differed significantly in their response to foliar blast infection with each of six levels of N manuring. Tests of varietal reactions should therefore be carried out with a standardized amount of N fertilizer.

1140 Chowdhury, K. A. & Ghosh, S. S.
Rice in ancient India.
Sci & Cult. 1953 : **19** : 207–09.

Charred grains of rice, believed to belong to the period 1000–750 BC, have been discovered during excavations near Meerut, United Provinces. The morphological and anatomical characters of the material are described.

1141 Lózsa, A.
Hazai rizsek fehérje-frakcióinak vizsgálata. (**Investigation of the protein fractions in native rices**).
Agrokém. és Talajtan 1953 : **2** : 147–60.

Data are provided on the total protein and oryzenin, albumin, globulin and prolamin fractions of 27 Hungarian and 3 American varieties. The Hungarian varieties contained appreciably more protein than the American varieties.

FORAGE GRASSES

1142 **Proceedings of the Sixth International Grassland Congress 1952, Pennsylvania 1952** : **1** and **2** : Pp. vi + 1801.

In addition to the general sessions, Volume 1 presents a report of the following sections: Genetics and breeding (abstracted below); Improvement and management of pastures, meadows and turf; Improvement and management of range lands; Ecology and physiology of grasslands; Soil management and fertilization; and Seed production and distribution.

Section A. Genetics and breeding. (*pp.* 207–346). *Session* 1. *Cytology of grasses and legumes.* (*pp.* 207–246).

Warmke, H. E. Apomixis in grasses, with special reference to Panicum maximum. (*pp. 209–15*).

The occurrence of apomixis in grasses is surveyed. In *P. maximum*, aposporous embryo sacs, developed from nucellar cells at or slightly before the time of degeneration of the macrospores, possess either 4 or 8 nuclei when mature. The former type, with 2 synergids, 1 egg and 1 polar nucleus and no antipodals, is the more common. Pseudogamy occurs, and endosperm divisions do not begin until after pollination and the union of male and polar nuclei. Parthenogenetic division of the egg cell is apparently stimulated by the endosperm divisions. It is suggested that in such a pseudogamous species the 4-nucleate embryo sac has the evolutionary advantage of maintaining the normal $3n/2n/2n$ balance of endosperm/embryo/maternal tissue, compared with the 8-nucleate embryo sac which imposes the relationship of $5n/2n/2n$.

Clausen, J. New bluegrasses by combining and rearranging genomes of contrasting Poa *species.* (*pp. 216–21*).

In interspecific hybridization of *Poa*, carried out at the Carnegie Institution of Washington, Stanford, Calif., since 1943, forms widely separated geographically or from contrasting environments have been used as parents, to produce apomictic hybrids which are balanced both genetically and with respect to specific environments or to large ranges of climatic differences (cf. *PBA*, Vol. XXIII, Absts. 1605–6). Strains from *P. scabrella* x *P. pratensis*, *P. ampla* x *P. pratensis*, *P. scabrella* x *P. ampla* and *P. ampla* x *P. pratensis* var. *alpigena* are described as examples of the promising selections being developed.

Armstrong, J. M. & White, W. J. Triticum-Agropyron *hybridization.* (*pp. 222–27*).

Work on *Triticum-Agropyron* hybridization is reviewed, with particular reference to breeding in Canada. Late generations of perennial hexaploid wheat x *A. elongatum* hybrids have exhibited increasing cytological stability. The grain of such hybrids lacks the characteristics necessary for making good flour and bread, but possesses high nutritive value as fodder grain. Repeated back-crossing and selection of *Triticum-A. elongatum* hybrids constitute a valuable method of producing not only rust-resistant commercial wheats (cf. *PBA*, Vol. XXII, Abst. 1762), but also of introducing other desirable characters of *A. elongatum* into wheat, such as resistance to yellow streak mosaic or Hessian fly and tolerance of alkaline soils.

In mass populations of *Triticum-Agropyron* amphidiploids, increased for several generations without selection, cytological regularity and fertility were not correlated, except in one population. It is suggested that by using combinations showing the least degree of F_1 pairing at metaphase I more stable amphidiploids might be produced.

Harlan, J. R., Snyder, L. A. & Celarier, R. P. Cytological studies of southern Great Plains grasses. (*pp. 228–32*).

Species of *Andropogon* and *Bouteloua* are being intensively studied in Oklahoma. Both *B. gracilis* and *B. curtipendula* are cytologically

complex, consisting of several forms having an autopolyploid or allopolyploid origin; in addition, the latter species contains asexual chromosome types with high aneuploid numbers (cf. Abst. 1165). One variety of *A. ischaemum*, King Ranch, is characterized by a high number of lagging univalents, whereas Turkish accessions of this species have no or few lagging univalents (cf. 1143). *A. caucasicus* ($2n = 40$) usually produces 1–6 univalents in the first meiotic division. *A. sericeus* ($2n = 20$) shows regular pairing. It is concluded that these and other genera of importance in the southern Great Plains are highly specialized grasses of recent geological origin, undergoing at the present time considerable cytogenetical evolution, the process of morphological specialization being much less intense.

Nielsen, E. L. Cytology in relation to breeding behavior in grasses. (pp. 233–39).

Literature dealing with the cytogenetics of autopolyploidy, allopolyploidy, aneuploidy, accessory chromosomes, apomixis and the production of micronuclei by chromatin-like globules is reviewed, with reference to many species of grasses and their breeding behaviour.

Löve, Á. & Löve, D. The geo-botanical significance of polyploidy. (pp. 240–46).

Studies on the geobotanical significance of polyploidy in European floras are surveyed.

Session 2. Genetics in relation to breeding forage crops. (pp. 247–91).

Stebbins, G. L. (Jun.). Species hybrids in grasses. (pp. 247–53).

Ways in which hybridization may be used to obtain improved forms are among the subjects discussed. Back-crossing may be used to transfer suitable characters from cereal species to forage grasses such as *Agropyron intermedium*, *A. elongatum* and *Hordeum bulbosum*. New ecotypes with entirely different adaptive qualities from those already existing may be secured by carefully chosen species; this method is most applicable in apomictic forms. In self-fertilized groups, such as the *Bromus carinatus-B. marginatus* complex and *Elymus glaucus*, the author has obtained as the result of selection, without chromosome doubling, increased fertility in the F_2 and later generations derived from highly sterile F_1 hybrids. Cytological and genetical conditions conducive to failure or success in the induction of allopolyploids of sterile interspecific hybrids are considered.

Picard, J. & Demarly, Y. Autofertilité chez la luzerne—son conditionnement biologique. (Self-fertility in lucerne—its biological conditioning). (pp. 254–59).

Strains of lucerne subjected to continuous inbreeding over four generations manifested an increasing degree of self sterility, the increase being particularly marked in the I_1 and later becoming more gradual. Experimental data were obtained suggesting that substances similar to auxins are exuded by the pollen grains and the stigma and play a considerable role in determining self sterility and self fertility.

Williams, W. Genetics of incompatibility. (pp. 260–66).

After discussion of the physicochemical nature of the incompatibility reaction, this general survey deals with three main systems: (1) heteromorphic incompatibility, in which the sporophytically-controlled reaction of the pollen is accompanied by differences in floral structure, as typified by *Primula*; (2) homomorphic incompatibility, under the gametophytic control of the pollen and involving a system of multiple allelomorphs, as in *Nicotiana* or *Trifolium*; and (3) homomorphic incompatibility, also conditioned by multiple allelomorphs at a single locus but under sporophytic control, as reported for *Crepis foetida* and *Parthenium argentatum*.

Brewbaker, J. L. & Atwood, S. S. Incompatibility alleles in polyploids. (pp. 267–72).

The interactions of competition and dominance, shown in matings involving colchicine-doubled plants of *Trifolium* spp., by diploid pollen heterogenic for two alleles at the locus *S*, are discussed in relation to their significance in breeding (cf. Abst. 1190).

Tomé, G. A. Alfalfa breeding progress in Argentina. (pp. 273–76).

A brief historical survey of lucerne selection and breeding, initiated in Argentina 25 years ago, is given. One of the chief objectives is resistance to nematode: promising selections, polycrosses and hybrids are under test at the different stations. Work by the author (cf. *PBA*, Vol. XVIII, Abst. 992) has resulted in the nematode-resistant and otherwise valuable strain FAV San Martín, now being multiplied. In recent trials, the first generation of a synthetic has not only significantly outyielded all the other types tested, but also has finer stems and is superior as a pasture type; the synthetic is composed of eight clones selected for yield and resistance to pests and diseases.

Burton, G. W. Quantitative inheritance in grasses. (*pp. 277–83*).

In this short review of the application of statistical methods to forage-grass breeding, the following aspects are considered: calculation of the minimum number of genes responsible for a given characteristic; estimation of population variability; types of gene interaction; partitioning of variation into genetic and environmental components; and the estimation of genetic correlation between characters.

Comstock, R. E. & Robinson, H. F. Genetic parameters, their estimation and significance. (*pp. 284–91*).

Formulae are given for representing the expected genetic superiority of selected individuals in terms of the selection criteria used and the interactions between genotype, location, time and replicate in plot trials. The application of the formulae to concrete problems by means of analysis of variance and covariance is explained. The authors emphasize that negative covariance between seed setting and an economic trait is liable to cause varietal deterioration; they also point out that, till now, few, if any, reliable estimates of genotypic variance have been made that exclude bias from genotype-environment interactions.

Session 3. *Breeding for improvement of forage crops.* (*pp. 292–346*).

Love, R. M. The value of induced inbreeding. (*pp. 292–98*).

Information on polyploids of Gramineae and leguminous species induced by colchicine and other means is surveyed, with reference to (1) the cytology, genetics and practical value of autopolyploids, (2) true genomic allopolyploids, and (3) autoallopolyploids, i.e. segregating amphidiploids, such as those of *Triticum-Agropyron*. Attention is drawn to the possibilities of inducing somatic reduction by colchicine and other agents, as a means of securing homozygous material, as reported by Franzke and Ross for sorghum (cf. *PBA*, Vol. XXIII, Abst. 349).

Wexelsen, H. The use of inbreeding in forage crops. (*pp. 299–305*).

Problems of inbreeding and of the value of inbreds compared with noninbred material for the production of hybrids and synthetics are discussed, mainly with reference to investigations in Scandinavian countries and to *Phleum pratense, Dactylis glomerata, Lolium perenne, Festuca rubra, Trifolium pratense, T. hybridum, T. repens* and *Medicago repens*.

Frandsen, K. J. Theoretical aspects of crossbreeding systems for forage plants. (*pp. 306–13*).

A general scheme of methods of breeding cross-fertilized forage crops is given, followed by comments upon a number of the problems involved, including: the relative value of different types of progeny test to measure combining ability; the difficulties connected with the selection of single parent plants from spaced plantings; the relative advantages and disadvantages of producing families by paired crossing, polycrossing and top-crossing; and methods of strain-building. The paper concludes with a short general discussion of breeding in relation to the environment.

Graumann, H. O. The polycross method of breeding in relation to synthetic varieties and recurrent selection of new clones. (*pp. 314–19*).

Referring chiefly to lucerne breeding at the Nebraska Agricultural Experiment Station, the author analyses the polycross technique as a means of determining combining ability, the problems involved in breeding synthetics and the value of recurrent selection. In lucerne, an inverse relationship between number of lines and the yield of the synthetic apparently exists. Information on the performance of lucerne synthetics in generations later than the syn-2 generation is required. Preliminary data have been secured at the Nebraska Station suggesting that (1) 2-clone combinations are more productive than multiple-clone synthetics in the syn-1; (2) forage yields decline with advance in seed generation, the rate of change during early generations being inversely proportional to the number of parental clones comprising the synthetic; (3) synthesis is completed by the third or fourth seed generation; and (4) upon completion of synthesis little or no difference in forage yield is shown between the 2-clone and multiple-clone synthetics.

Polycross combinations make possible the production of numerous recombinations for a new cycle of selection. Polycross progeny of lucerne clones, developed by four cycles of selection for bacterial-wilt resistance by the polycross technique, have exceeded by over 57% the wilt resistance of the original parents, which were moderately resistant. Introduction of unrelated stocks in each cycle ensures a valuable degree of genetic divergence.

Murphy, R. P. Comparison of different types of progeny in evaluating breeding behavior. (*pp. 320–26*).

Clonal plants of cocksfoot, smooth brome and

red fescue were studied in progeny tests at Ithaca, NY, each plant being represented by polycross seedlings, selfs and vegetative pieces. The performance of the parents for forage yield was positively correlated with that of their progeny in all three types of test, whether grown in space-planted rows, drilled rows or broadcast-seeded plots. Similar parent-progeny relationships for other characters were obtained, but the correlation coefficients were higher than those for forage yield. The results suggested that any of the progeny tests and methods of planting studied can be used to isolate mother plants giving the best performance.

Johnson, I. J. Evaluating breeding materials for combining ability. (*pp. 327–34*).

Investigations on the evaluation of combining ability are reviewed, with reference to maize and forage species, and to types of tests and choice of testers, factors affecting the desired randomness of cross or self pollination, the relationship between different types of test, and the relationship between general combining ability and yields of synthetics. Additional information on the latter aspect is regarded as a critical need in forage-crop breeding. Data from controlled F_1 crosses have been used to estimate the ultimate yields of synthetics, but it is difficult to obtain sufficient seed for testing from controlled single crosses; study of the relationships between general combining ability, specific combining ability and the performance of synthetics could therefore lead to improved procedures of breeding.

White, W. J. & Stevenson, T. M. The Canadian cooperative program of forage crop improvement. (*pp. 335–40*).

The organization of the agencies and facilities for the improvement of forage crops in Canada is outlined, emphasis being laid upon the cooperative work involving the units of the Experimental Farm Service of the Federal Department of Agriculture, the Science Service and the agricultural colleges.

Kramer, H. H. Agronomic problems of strain evaluation with forage crops. (*pp. 341–46*).

Procedures of evaluating new varieties and strains of forage grasses and legumes are considered in relation to (1) optimum plot size for maximum efficiency, (2) type of experimental plot, (3) the desirability of using legume-grass mixtures, (4) level of soil fertility and (5) the type of data which should be recorded.

Volume II gives the proceedings of the following sections: Soil and water conservation; Harvesting and preservation of forage; Use of forage in livestock feeding; Machinery; Experimental procedure in grassland research; and Improvement and management of tropical grasslands. Six joint sessions are also reported: Techniques in forage plant breeding (abstracted below); Weed and insect control in forage production; Harvesting and processing of forage seed; Development and use of machinery for conditioning forage in the field preparatory to storage; and Symposium on dry hay.

Joint Session. Section A and K. Techniques in forage plant breeding. (*pp. 1565–1619*).

Jones, F. R. Testing for disease resistance. (*pp. 1567–72*).

The author comments upon methods of testing for disease resistance in improving forage crops, largely with reference to his own work on resistance to cold, bacterial wilt and common leaf spot in lucerne in the United States.

Kreitlow, K. W. Induced epiphytotics. (*pp. 1573–77*).

Methods of inducing artificial epidemics for screening large numbers of plants are surveyed.

Corkill, L. Breeding for resistance to blind seed disease (Phialea temulenta, *Prill & Delarc.*) *in ryegrass* (Lolium *spp.*). (*pp. 1578–84*).

The development of improved techniques of inoculating ryegrass with ascospores and macroconidia of *Ph. temulenta* in breeding work in New Zealand is outlined. So far no truly resistant plants have been discovered. Breeding for escape from infection is therefore the best approach at present to the problem of this disease. Strains with early or late flowering would tend to escape infection by disparity between their time of flowering and the period of maximum concentration of the ripe apothecia. In addition, evenness of flowering among individual plants would render such strains more likely to escape infection by reducing the period between the beginning and completion of flowering. Use of early or late maturing strains would not however ensure the production of well-germinating seed crops in all seasons. At present the disease-escaping commercial local strains are unsatisfactory with respect to some agronomic characters. Relatively small differences in the daily rhythm of flowering may also facilitate escape and merit the attention of the breeder.

Stanford, E. H. Transfer of disease resistance to standard varieties. (*pp. 1585–90*).

The value of the back-cross technique to incorporate disease resistance and other desirable characters in varieties of forage species is emphasized, and exemplified by the lucerne variety Caliverde, whose development by repeated back-crossing and selection of the cross Turkestan Sel. 132–3 x California Common at the University of California is described in detail. Caliverde is essentially similar to California Common but resistant to bacterial wilt, leaf spot (*Pseudopeziza medicaginis*) and mildew (*Peronospora trifoliorum*). Resistance to the former disease was derived from Turkestan Sel. 132–3, resistance to the latter two from a line of California Common. Breeding has been initiated to transfer to Caliverde resistance to dwarf disease from California Common 49 and resistance to nematode (*Ditylenchus dipsaci*). It is pointed out that the final product of a back-cross programme is amenable to further improvement by the polycross technique, and that a synthetic developed by polycrossing can also be improved by back-crossing.

Bingefors, S. Nematode resistance in clover and lucerne. (*pp. 1591–96*).

Selection and breeding for resistance to *Ditylenchus dipsaci* in Sweden are surveyed, mostly with reference to red clover (cf. *PBA*, Vol. XXI, Absts. 396 and 1919). No evidence of nematode races has so far been obtained from Swedish populations of the pest. Selection of winter-hardy local strains for nematode resistance and hybridization involving resistant selections and strains have been carried out in red clover breeding; difficulty has been experienced in obtaining a combination of nematode resistance and sufficient hardiness. Details of a method of artificial infection for intensified selection are given. Studies on the nature of nematode resistance, chiefly in red clover, have indicated that the development of the larvae after penetration is repressed in resistant plants (cf. *PBA*, Vol. XXII, Abst. 466). So far it has not been possible to make a complete hypothesis of the inheritance of resistance. In crosses between resistant and susceptible material, however, a high percentage of resistant offspring has been obtained.

Smith, D. C. Breeding for quality. (*pp.* 1597–606).

Research relevant to the improvement of the quality of forage plants by breeding is reviewed. Lines of investigation likely to prove useful are briefly suggested. Morphological, physiological and histological studies might disclose other characters associated with palatability and nutritional value, in addition to chemical properties. The development of suitable techniques of analysis and assay of nutritional value, for incorporating in breeding procedures, is at present the outstanding problem.

Wit, F. Techniques of breeding cold-resistant grasses and clovers. (*pp.* 1607–12).

Methods of artificial cold-tests reported in the literature are discussed. The author describes a method he has found satisfactory for testing a large number of plants of grasses or clovers in a single experiment. Bundles of 25–40 naturally hardened seedlings are placed into racks in a freezing chamber, where they are cooled for one day at 0°C and then at — 2°C, after which the temperature is gradually lowered to a temperature ranging from —12° to —16°C. After some hours, the temperature of the chamber is gradually raised to 0°C. After thawing, the seedlings are planted in the greenhouse, and data for the evaluation of cold resistance are recorded 2 to 3 weeks later. During the past season, over a 100 F_3 generations of crosses between perennial and Italian ryegrass and about 90 populations of perennial ryegrass have been screened by this method at the Foundation for Plant Breeding, Wageningen, Netherlands. Cold resistance and spring development in ryegrass show a highly negative correlation.

Keller, W. Emasculation and pollination technics. (*pp.* 1613–19).

Information on techniques reported for forage grasses and legumes is reviewed, chiefly with reference to papers published in the United States and Canada.

1143 **Annual Report of Progress in Forage Crops Research in Oklahoma conducted by the Oklahoma Agricultural Experiment Station 1952** : Pp. 75 + 14 + 11 + 20. (Mimeographed).

Accessions grown in 1951 and 1952 are listed and brief general comments are made on their performance. The results of tests of varieties and strains of many pasture and forage grasses and legumes are summarized.

Poa. *P. arachnifera* is being studied cytologically.

Andropogon. Data have been obtained suggesting that *A. ischaemum*, belonging to the subgenus *Bothriochloa*, consists of two types,

differing morphologically and cytologically. One group, from Europe and Asia Minor, shows only minor cytological abnormalities; the other, represented by two samples believed to have been introduced from China, is very irregular with respect to chromosome behaviour. Cytological studies have been carried out on three other members of this subgenus: *A. pertusus* ($2n = 40$), *A. intermedius* ($2n = ca.\ 40$) and *A. caucasicus* ($2n = 40$). In subg. *Dichanthium* the following representatives have been cytologically investigated: *A. sericeus* ($2n = 10$), *A. annulatus* ($2n = ca.\ 40, 60$), *A. nodosus*, *A. aristatus*, *A. caricosus*, *Andropogon* sp. 'T–20136' and *Andropogon* sp. 'PI 18084,' the last five forms all having $2n = 40$. Cytotaxonomical study of sect. *Arthrolophis* has been initiated; *A. subtenus*, *A. tracys*, *A. floridanus* and *A. pumilus* have been found to have $2n = 20$. Apomixis is suspected in both groups of *A. ischaemum*. Specific or subspecific hybridization evidently played a part in the origin of most of the *Andropogon* samples possessing agronomic importance. The value of the hot water method of emasculation is being explored. Open-pollinated progenies provide an efficient basis of determining general combining ability in sand bluestem.

Sorghastrum. The performace of open-pollinated progenies has been found to be a good indication of general combining ability in Indian grass.

Sorghum. Crosses were made between various types of Sudan grass and forage sorghums, in an attempt to develop improved sweet Sudan types.

Panicum. Further evidence was obtained that individual plants of switchgrass differ greatly in combining ability, whether this ability is measured by the performance of progenies from seed produced by open-pollination or in isolation blocks.

Buchloe. In the synthetic hybrids of buffalo grass established in the 1951 nursery, the overall ratio of ♀ : ♂ plants was 5 : 1. In one line the ratio was 1 : 1. All the plants were desirable in type. A few plants in one line bore occasional perfect flowers. Sex determination is to be genetically investigated. Seedling vigour was associated with seed size.

Other grasses. Breeding of sand lovegrass, smooth brome, and side-oats and blue grama continued.

Medicago. The upright plant habit of common lucerne is dominant to the prostrate habit of wild Turkish introductions. An attempt is to be made to cross *M. glutinosa* and *M. gaetula*, species showing spreading habit and drought resistance, with Turkish selections, in order to develop a range lucerne.

1144 Georlette, R.
Bibliographie générale concernant les graminées prairiales des régions tempérées. (**General bibliography concerning the meadow grasses of temperate regions**).
Ann. Gembl. 1953 : **59** : 237–55.

This review, based on a literature list of 14 pages, includes a section on the genetics and breeding of meadow grasses in various countries, with a corresponding bibliographical section of 80 references.

1145 **Report of the second meeting of the working party on Mediterranean pasture and fodder development, Algiers 28 April to 2 May 1953.**
FAO UN, Rome 1953 : Pp. 46. (Mimeographed).

Testing and multiplication of species and varieties for fodder and pasture formed one of the main topics discussed, several speakers describing the results of trials in different countries. O. S. Aamodt analysed the problems of producing local seed in the Mediterranean area.

A long-term project of collating ecological information for Mediterranean countries is referred to among the conclusions and recommendations. The main lines of cooperative research suggested included: continuation of uniform trials under the chief ecological conditions; tests of introduced grain and fodder sorghums in comparison with local types; and investigation of the seed-producing characteristics of promising grasses and legumes.

1146 Julén, G.
Svalöfsstammar av ängsgröe. (**Svalöf strains of smooth-stalked meadow grass**).
Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1952 : 19–21.

The characteristics and performance of the new variety Sv 01610, bred at Svalöf, have been compared with Skandia II, Fylking and other varieties tested in grass mixtures.

Skandia II closely resembles the ordinary commercial varieties in its developmental rhythm and total yield, but sends out shoots more rapidly, thus forming a strong, dense mat in its first year.

Sv 01610 is extremely early and its production in spring and early summer is very high, but remarkably low in autumn.
In trials at Svalöf in a white clover mixture, the total yield of grass and clover was approximately equal in mixtures containing Skandia, Primo or Gullåker, but was 5% higher when Fylking or Sv 01610 was included. For the yields of grass alone, the same general trend, but even more marked, was recorded.
Sv 01610, which is now undergoing multiplication, forms a useful supplement to the existing Svalöf varieties and is, in addition, superior to the older Swedish varieties in yield of seed and reliability of seed production. It appeared to have no injurious competitive effect on the growth of white clover in the mixture.

1147 Skalińska, M.
Cyto-ecological studies in *Poa alpina* L. var. *vivipara* L.
Bull. Int. Acad. Pol. Sci. Cracovie 1951 (1952) : 253–83.

Investigations were carried out on 111 biotypes of *P. alpina* var. *vivipara* and two strains of var. *seminifera* collected in Poland from the Tatra mountains and the adjacent range of Picniny. Seven chromosomal types were discovered among the viviparous clones, with $2n = 14$, 22, 26, 28, 33, 34 and 35. The two strains of var. *seminifera* had chromosome numbers of $2n = 22$ and 33, respectively. The chromosomal types of var. *vivipara* showed differences in edaphic and altitudinal preferences, although their areas of distribution overlapped. The type with $2n = 14$, evidently representing the most ancient form, was found growing in a very sheltered habitat at a relatively low altitude. Considering both varieties, it is suggested that types with $2n = 14$ and 28, and those with $2n = 22$ and 33 represent two different series: the first consists of diploids and tetraploids with $x = 7$, and the second of diploids and triploids with $x = 11$. Forms with $2n = 26$ could have arisen from sexual strains by hybridization of secondary diploids ($2n = 22$) with secondary triploids ($2n = 33$), the aneuploid number being subsequently stabilized by vivipary. Biotypes with $2n = 34$ and 35 could have evolved as the result of secondary intraclonal differentiation of the secondary triploid type. *P. alpina* is regarded as a species which underwent a postglacial migration to Northern Europe; the absence of types with lower numbers of chromosomes in Scandinavia and the Arctic suggests that only types with higher chromosome numbers were capable of spreading northwards, their migration occurring before the development of the viviparous habit.

1148 Åkerberg, E.
Svalöfs Omnia timotej. (**Svalöf Omnia timothy**).
Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1952 : 16–19.

The performance of Omnia (cf. *PBA*, Vol. XVIII, Abst. 1639), as compared with five other varieties bred at Svalöf, Weibullsholm and Hammenhög, is recorded.

1149 Heikinheimo, A.
Tammiston timotei. (**Tammisto timothy**).
Siemenjulk. Hankkijan KasvinjalosLaitos Tammisto 1950 : 126–28.

A brief account is given of Tammisto timothy, put on the market in 1948 and developed from a cross between the northern Swedish strain Bottnia and the local Finnish strain Hautila. In southern Finland, this variety has shown itself superior to the best Finnish local strains, and more so to commercial strains. It has good foliage and stem formation, giving a good yield at the first cut, a moderate aftermath and an abundant seed yield.

1150 **Suwannee Bermuda grass is intended for deep sand, not for the heavier soils.**
What's New Crops Soils 1953 : **6** : No. 2 : p. 22.

Suwannee Bermuda, a new variety of Bermuda grass, is described. It possesses a high degree of disease and drought resistance, yields well, and is designed to grow on deep sands at moderately low levels of fertility.

1151 Julén, G.
Svalöfs Prior foderlosta. (**The Svalöf brome grass Prior**).
Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1952 : 21–22.

The history, origin, performance and use of this new variety of *Bromus inermis* are set out (cf. *PBA*, Vol. XXII, Abst. 2764).

1152 Hendrickson, B. H.
Recent trials with rescue grass.
Bett. Crops 1953 : **37** : No. 7 : 20–22, 39.

Mention is made of Chapel Hill rescue grass (*Bromus catharticus*), a strain resistant to head smut, moderately resistant to mildew and well adapted in the southeastern region of the United States.

1153 **Southland—vigorous bromegrass for Oklahoma and Upper South.**
Sth. Seedsman 1953 : **16** : No. 11 : p. 22.
Southland, a vigorous, high-yielding new variety of brome grass, is described. In trials in Oklahoma, it produced a 25% heavier yield than Achenbach, the next best variety, and also shows good resistance to leaf rust.

1154 Enkele problemen bij de veredeling van graslandplanten, in het bijzonder met het oog op de doelmatige intensivering het weidebedrijf. (**A few problems in breeding forage grasses, with special reference to the systematic intensification of pasture husbandry**).
Versl. StudKring. PlantVeredel., Wageningen 1952 : 480–94. (Mimeographed).
Methods of grassland management practised in Denmark, England, New Zealand and the Netherlands were compared. Perennial ryegrass cultivation will become increasingly important in the future, and ways in which this species can be improved are suggested. Hybridization with Italian varieties may result in more vigorous growth.

1155 Julén, G. & Halling, S.
Resultat från försök med svenska ängssvingelstammar. (**Results from trials with Swedish strains of meadow fescue**).
Sverig. Utsädesfören. Tidskr. 1953 : **63** : 181–200.
After a review of the history of meadow fescue in Sweden, the performance of Swedish varieties, now on the market, and of a new Svalöf strain, Sv 01205, in trials at Svalöf and research centres in other localities, is compared.
Grown as a hay crop, Svalöfs tidiga [Svalöf Early] and Mimer, bred at Weibullsholm, surpassed Svalöfs sena [Svalöf Late] in total yield in southern Sweden, while Svalöfs sena gave the highest yield elsewhere, except in Upper Norrland where Bottnia did best. The Hammenhög variety, Fepra, approximately equalled Svalöfs sena in southern Sweden, but not elsewhere. Sv 01206 outyielded all the rest at Ultuna and places further north, though in southern Sweden it was inferior to Svalöfs sena. Bottnia is a typical long-day type, producing few stems in southern Sweden, but, by repeated cultivation in that region, a short-day type is being evolved, yielding in the south almost as much as Svalöfs sena and quite as productive in Upper Norrland as the original Bottnia strain. Natural selection for short day has thus apparently not adversely affected its winter hardiness or persistence under northern conditions.
Results of pasture trials, in which all except Bottnia were included and the grasses were grown as mixtures with clover, are also discussed.

1156 Burton, G. W. & DeVane, E. H.
Estimating heritability in tall fescue (*Festuca arundinacea*) from replicated clonal material.
Agron. J. 1953 : **45** : 478–81.
In order to estimate the progress to be expected in developing a variety better adapted to the lower Coastal Plain of Georgia, data were obtained from 49 clones replicated six times. The total genetic variance (V_G) was calculated according to the formula $V_e + NV_G$ = expectation of the clone mean square, V_e representing the expectation of the error mean square and N the number of replications of each clone. The F values for yield, greenness, disease resistance and various measurements of forage yield all exceeded the 1% level of significance. Values (S) for the expected gains from selection indicated that, except for seed yield, an advance of 33–72% over the population mean could be secured by selecting the top 5% of the population. The S value for seed yield was 161% higher than the mean. Intercrossing between clones of two high yielding, self-sterile plants is regarded as the most promising method of breeding. The various measurements of forage yields were positively and significantly correlated with greenness.

1157 Juhl, H.
Über zwei spontane Änderungen der Chromosomenzahl in Gramineen-Wurzeln. (**On two spontaneous changes in the chromosome number of Gramineae roots**).
Ber. dtsch. bot. Ges. 1953 : **66** : 289–95.
Two cases of spontaneous change in chromosome number are reported. In a specimen of *Festuca rubra* ($2n = 56$), a root cell was found with 49 chromosomes, an entire genome being absent. A tetraploid sector was found in a specimen of *Lolium perenne* ($2n = 14$). The cells of the tetraploid sector were considerably larger than the diploid cells, but the chromosomes were smaller.

1158 **A simple method for distinguishing tall and meadow fescue.**
Agron. J. 1953 : **45** : 453–54.
At the Georgia Agricultural Experiment Station,

all the plants of tall fescue (*Festuca arundinacea*) examined have borne cilia on the margin of the auricle, whereas no plant of meadow fescue (*F. elatior*) has been found with such cilia. Chromosome counts confirmed the identities of the species. It is suggested that other investigators examine additional plants, so that it may be decided whether this character could be incorporated in a key separating the two species.

1159 Jansen, P.
Notes on Malaysian grasses III.
Acta Bot. Neerl. 1953 : **2** : 363–86.
Descriptions are included of the following newly discovered *Festuca* species: *F. parvipaleata* from New Guinea and *F. sumatrana* from Sumatra.

1160 **Reed canary-Harding grass hybrid hot California item.**
Sth. Seedsman 1953 : **16** : No. 12 : p. 59.
A natural hybrid between Reed canary grass and Harding grass has been discovered at the University of California. The perennial hybrid forms a sod like Reed canary grass and is a strong winter grower like Harding. Selection to improve the hybrid is in progress.

1161 Fairbrothers, D. E.
Relationships in the *Capillaria* group of *Panicum* in Arizona and New Mexico.
Amer. J. Bot. 1953 : **40** : 708–14.
Satisfactory diagnostic characters have been found for separating *P. stramineum* from either *P. hirticaule* or *P. capillare* in mixed populations, and also for separating *P. capillare* and *P. hirticaule*. The data suggested that complexes of *P. hirticaule* and *P. pampinosum* should be regarded as consisting of one variable species, *P. hirticaule*.

1162 Covas, G. & Cialzeta, C.
Híbrido natural *Phalaris tuberosa* x *Phalaris minor*. (**Natural hybrid *Ph. tuberosa* x *Ph. minor***).
Idia 1953 : No. 63 : 4–5.
Three natural hybrids were found in the progeny of *Ph. tuberosa* grown in close proximity to a plot of *Ph. minor*. The hybrids had 28 somatic chromosomes like the parent species but at meiosis varying numbers of univalents and anaphase bridges were frequently observed. The anthers contained only 9·8% of fertile pollen grains and failed to dehisce.
The hybrids displayed heterosis and had inherited from *Ph. minor* its resistance to *Stagonospora foliicola*.

1163 Covas, G. & Cialzeta, C.
Alopoliploide sintético del género *Phalaris*, de posible valor económico como planta forrajera. (**A synthetic allopolyploid of the genus *Phalaris* of possible economic value as a forage plant**).
Idia 1953 : No. 62 : 8–10.
At the Castelar station in Argentina 24 natural hybrids were obtained from 594 plants of *Ph. arundinacea*, grown in proximity to *Ph. tuberosa*; the reciprocal cross was less frequent. The hybrids are more vigorous than *Ph. arundinacea*, their panicles more compact, their stolons longer and their root apices red; the plants are male sterile but set about 5% of grain when grown near the parental species. The number of bivalents observed varied from 9 to 14. By colchicine treatment of the roots a polyploid hybrid was obtained which had 53·1% fertility in the anthers and gave a seed set of 46·8%. The polyploid had roughly 56 chromosomes and larger panicles and seeds and is considered a promising source of selection material for raising new forage crops.

1164 Davies, W. E.
The breeding affinities of some British species of *Agrostis*.
Brit. Agric. Bull. 1953 : **5** : 313–16.
Flowering and self fertility in *A. canina* vars. *fascicularis* and *arida*, *A. tenuis*, *A. stolonifera* and *A. gigantea* are described. Seed setting under selfing conditions was extremely low in all species. Crossing between the five species and varieties in all possible directions was attempted. Ten out of the possible 20 crosses were successful, 8 of these being reciprocal crosses. Data on the fertility of the F_1 hybrids are discussed in relation to their possible bearing upon interspecific affinities. The relationships suggested agree with those indicated by cytological data (cf. Abst. 1165).

1165 Jones, K.
The cytology of some British species of *Agrostis* and their hybrids.
Brit. Agric. Bull. 1953 : **5** : p. 316.
A. canina var. *fascicularis* and var. *arida* have been found to be diploid ($2n = 14$) and tetraploid ($2n = 28$), respectively. The cytological behaviour of their F_1 hybrid ($2n = 21$) suggests that three genomes in the triploid hybrid are highly homologous. The sterility of the triploid hybrid, however, must ensure genetic isolation between the two varieties. In the F_1 between *A. tenuis* ($2n = 28$) and *A. canina* var. *arida*, pairing is complete, with an average of 2·86

quadrivalents per PMC, suggesting that these two parents are very closely related, and that *A. tenuis* may possibly be a functional allopolyploid derived from an autotetraploid. Little evidence was obtained of affinity between *A. canina* var. *arida* and *A. stolonifera* ($2n = 28$). *A. tenuis* and *A. stolonifera* probably have at least one genome in common. Data from F_1 hybrids of *A. gigantea* ($2n = 42$) with *A. tenuis* and *A. stonolifera* suggest that the genomes of the latter two species are homologous with two out of the three genomes of *A. gigantea.*

1166 Snyder, L. A. & Harlan, J. R.
A cytological study of *Bouteloua gracilis* from western Texas and eastern New Mexico.
Amer. J. Bot. 1953 : **40** : 702–07.

Chromosome counts were carried out on plants from over a hundred localities. Numbers of $2n = 20$, 40, 42 and 60 were obtained for 36, 56, 6 and 11 collections, respectively. The single collection from Oklahoma had $2n = 84$ chromosomes and regularly exhibited 42 bivalents. The cytological data suggested that the 40-chromosome plants were tetraploids, and the 42-chromosome plants aneuploids derived through nondisjunction in the tetraploids. Plants with $2n = 60$ formed up to five hexavalents. The basic chromosome number of the genus *Bouteloua* is regarded as $x = 10$. No consistent correlation between growth habit or other morphological characters and chromosome number could be detected. The polyploids showed a wider geographical range than the diploids, but the distributions of the two forms overlapped extensively. The polyploids were also found in a wider range of habitats.

1167 Hunziker, J. H.
Informe de un viaje de estudios a los Estados Unidos. (**Report on a study tour to the United States**).
Idia 1953 : No. 62 : 18–20.

Studies were made on the morphology and cytological features of a number of species of *Elymus* and *Agropyron* and of the following hybrids: *E. patagonicus* x *E. glaucus*, *A. scabriglume* x *E.* aff. *antarcticus*, *E.* aff. *antarcticus* x *A. scabriglume*, *A. scabriglume* x *E. glaucus* and *A. scabriglume* x *A. inerme.* The hybrids, which were mostly intermediate between the parental species in morphological characters, were all sterile except *A. scabriglume* x *E.* aff. *antarcticus*, which set 0·18–2·8% of seed. Meiosis was highly irregular in most of the hybrids but 7 or more bivalents were observed regularly in *E. patagonicus* x *E. glaucus.* A marked degree of autosyndesis was observed in all hybrids where *A. scabriglume* was involved, suggesting that this species is a segmentary allopolyploid. The conclusion is reached that both *Elymus* and *Agropyron* are artificial genera. A brief account is given of some of the genetical investigations in progress in some of the research institutions in California and New York which the author visited during a recent tour.

1168 Hunziker, J. H.
Estudio citogenético de un híbrido entre *Elymus* y *Agropyron* (Gramineae). [**Cytogenetic study of a hybrid between *Elymus* and *Agropyron* (Gramineae)**].
Idia 1953 : No. 62 : p. 22.

The hybrid *E. patagonicus* x *A. scabriglume* showed pairing due both to autosyndesis and allosyndesis; this combined with incomplete pairing and bridge formation indicates the presence of structural heterozygosis in *A. scabriglume* (cf. Abst. 1167).

1169 Cugnac, A. de
Nouvelles observations sur l'hybride intergénérique expérimental x *Agroelymus Piettei* A. de Cugnac. (**New observations on the experimental intergeneric hybrid x *Agroelymus Piettei* A. de Cugnac**).
Bull. Soc. Bot. Fr. 1953 : **100** : 138–40.

The writer identifies the above hybrid as *Elymus canadensis* var. *glaucifolius* Torr. x *Agropyrum caninum* R. et S.

In a series of direct and reciprocal crosses between the two parent species, the average set was 42%. The hybrids comprised ears (*a*) of the agropyroid type with solitary spikelets, and (*b*) of the mixed type in which twin spikelets were found in association with solitary spikelets in the same ear at different levels. Incomplete dominance of this nature has been observed in other hybrids between *Agropyron* and *Elymus* or *Hordeum.*

Though *E. canadensis* var. *glaucifolius* x *A. caninum* flowered copiously, attempts at pollination were unsuccessful. A cytological study of meiosis in the hybrid will be published.

1170 Heinrichs, D. H.
Methods of breeding *Agropyron intermedium.*
Canad. J. Agric. Sci. 1953 : **33** : 470–93.

Investigations were carried out at the Dominion Experiment Station, Swift Current, Sask., to study (1) the seed-setting ability of 34 clones when open-pollinated and when crossed and selfed under bagged conditions, in both the

greenhouse and field; and (2) 20 characters of the clones and their open-pollinated and polycross progenies. The clones differed considerably in their capacity to set seed when open pollinated or subjected to controlled hybridization; probably this variability was largely genetically determined; 17·7% of the clones were practically female sterile. All the clones were highly self sterile. The lines also differed markedly in percentage of normal pollen, but male and female sterility were not closely associated. Highly significant differences between the clones and between their hybrid progenies were obtained for all 20 characters. The association between parent clones and progenies was much greater for morphological characters than for yield and vigour. Associations between plant characters are discussed in relation to their use in selection. Positive significant correlations of yield with autumn vigour and plant density are considered to be especially valuable.

LEGUMINOUS AND OTHER FORAGE PLANTS

1171 Gerdes, G.
Untersuchungen über die Samenfarbe und über die Höhe des absoluten Gewichtes (Tausendkorngewicht) bei Sorten der wichtigsten kleeartigen Futterpflanzen. [**Investigations on the seed colour and absolute weight (weight per thousand grains) in varieties of the most important forage plants of the clover type**].
Züchter 1953 : **23** : 334–41.

An account of varietal differences in seed colour and 1000 grain weight is given for *Melilotus* and for a number of species of *Trifolium* and *Medicago*.

1172 Behm, C. L.
Är en luzern av betestyp att emotse? (**Can we look forward to a lucerne of the grazing type?**)
K. LantbrAkad. Tidskr. 1953 : **92** : No. 2–3 : 185–93.

Following a tour of research centres in Canada and the USA, the writer records his views on the grazing types of lucerne that are being bred in both countries, with observations on the varieties Rhizoma and Nomad (cf. *PBA*, Vol. XXII, Abst. 1987, and Vol. XXIII, Abst. 1262). At Saskatoon, Swift Current and Lethbridge, the still unnamed hybrid material, derived from crosses of Siberian yellow lucerne (*Medicago falcata*) with the Kashmir variety Ladak, impressed the author so favourably that he obtained some seed for testing in Sweden.

1173 Torssell, R., Åkerberg, E. & Torssell, B.
Några resultat från förädlingen av lusern vid Sveriges Utsädesförenings Ultunafilial. (**Some results in lucerne breeding at the Ultuna Branch Station of the Swedish Seed Association**).
K. LantbrAkad. Tidskr. 1953 : **92** : No. 2–3 : 164–84.

Work for many years past at the Ultuna Station on the biology of flowering and seed production in lucerne is reviewed, with an account of the origins and systematic relationships of the lucerne strains grown in Sweden. They belong to the type derived from crosses between *Medicago sativa* and *M. falcata*. Torssell's methods of lucerne breeding at Ultuna involving (1) the polycross technique, and (2) natural selection, in populations by repeated seed raising, are described (cf. *PBA*, Vol. XIX, Abst. 673), with notes on some of the best strains evolved, e.g. 0611 and 0615, which have outyielded Grimm by about 10% on the average. Hardiness, persistence and seed production have also been studied, and in seed breeding experiments the strains 0602 and 0615 have equalled du Puits in seed yield.
Further hybridizations with *M. falcata* ecotypes should lead to valuable results in lucerne breeding in Sweden.

1174 Kohli, S. P.
Comparison of different methods of testing used in the breeding of cross pollinated forage crops and grasses.
Indian J. Genet. 1952 : **12** : 52–68.

An account is presented of the lucerne breeding programme in the USA and data are tabulated to illustrate the statistical methods employed. Synthetic varieties are being widely used to exploit hybrid vigour. Genetic drift in small breeding populations may be avoided by the use of a wider choice of parental material in synthetic varieties.

1175 Sinskaja, E. N.
(**Wild lucernes of the Caucasus and the prospects of using them in breeding and seed growing**).
Trud. Prikladnoĭ Bot. Genet. Selekcii (Bull. Appl. Bot. Pl.-Breed.) 1948 : **28** : No. 1 : 11–47. [Russian].

Caucasian forms of *Medicago hemicycla*, *M. coerulea*, *M. praesativa*, *M. glutinosa*, and some diploid forms of yellow lucerne previously

classified under *M. falcata*, showed a high degree of variability and comprised a large number of ecotypes. Many of these, including the new species *M. quasifalcata* and *M. difalcata*, are described. A new theory of origin of all the above forms from *M. praehemicyla* is outlined. For instance, it is thought that *M. praesativa* may have evolved from *M. praehemicycla* by doubling the chromosome number. The tetraploid forms of *M. falcata* may have originated by a similar method but an alternative possibility of their origin from *M. glutinosa* by gradual changes without doubling the chromosome number is also considered. Results of interspecific hybridization involving crosses between species with the same or different chromosome number are presented. Mention is made of fertile hybrids of *M. coerulea* ($2n = 16$) with *M. sativa* ($2n = 32$) and *M. glutinosa* ($2n = 32$) and of natural hybrids of *M. hemicycla* ($2n = 16$) x *M. glutinosa* and *M. coerulea* x *M. falcata* ($2n = 32$). The crosses *M. sativa* x *M. falcata*, *M. sativa* x *M. quasifalcata*, *M. sativa* x *M. glutinosa*, *M. hemicycla* x *M. glutinosa* and *M. glutinosa* x *M. falcata* are regarded as interesting from the breeder's viewpoint.

1176 **Tree alfalfa thrives in arid Morocco desert.**
Seed World 1953 : **73** : No. 5 : p. 38.

A short popular account of *Medicago arborea*, observed growing in highly arid parts of the Moroccan desert, is given.

1177 **For semi-arid areas—try Pilca Butta alfalfa.**
Sth. Seedsman 1953 : **16** : No. 12 : p. 64.

Pilca Butta, a lucerne variety introduced from Australia in 1940, has proved highly resistant to drought and frost.

1178 Keim, W. F.
An embryo culture technique for forage legumes.
Agron. J. 1953 : **45** : 509–10.

A method of excising and culturing immature embryos is described; the technique has been found to be particularly satisfactory in interspecific hybridization of clovers and birdsfoot trefoil.

1179 Julén, G.
Svalöfs Silo rödklöver. (**Svalöf Silo red clover**).
Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1952 : 8–11.

The yields obtained in the first, second and third cuts and also the protein content of the hay from the variety Silo (cf. *PBA*, Vol. XXIII, Abst. 417) are recorded from results of comparative variety trials at Svalöf.

1180 Julén, G.
Några erfarenheter från försök med tetraploida klöverstammar. (**Some findings derived from trials with tetraploid clover strains**).
Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1952 : 11–14.

Results are cited from extensive trials of red clover at Svalöf and branch stations of the Swedish Seed Association, showing the superiority of the tetraploid strain Sv 034 as compared with Merkur and Wambåsa (cf. *PBA*, Vol. XII, Abst. 468).

In yield trials of Alsike clover on a smaller scale the best line so far has been Sv 0205 (Svea x Øtofte-alsike), which has given promising results, especially as regards aftergrowth.

The superior fodder value of the tetraploids has already been fully treated in a previous article (cf. *PBA*, Vol. XIX, Abst. 2628).

1181 Hawkins, R. P.
Investigations on local strains of herbage plants. II. Types of red clover and their identification.
J. Brit. Grassl. Soc. 1953 : **8** : 213–38.

A survey is given of the history and origin of red clover; it is concluded that British strains, if not actually derived from local wild types, at least owe many of their characters to intercrossing with such forms. Most strains grown in Britain fall into three main types, viz. broad or double-cut, single-cut and late flowering red clovers; a few strains are however intermediate in type. Detailed data are presented from which it is concluded that the number of internodes on the main stem at the time of flowering enables the different types to be distinguished with precision. Using this criterion, a large number of strains have been classified. The use of internode number in testing for varietal purity and in identifying crops grown for seed is also described.

1182 Ščeglova, O. A., Beljdenkova, A. F., Leĭsle, F. F. & Kojakina, V. F.
(**The conditions for phasic development, one of the essential factors determining geographical distribution and morphological variability in plants**).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1953 : No. 4 : Ser. Biol. : 52–74. [Russian].

Some red clover varieties were treated for several generations during their vernalization

phase with variable temperatures or given short photoperiods during the light phase. Modifications in the shape of leaves and inflorescences and improved seed production and 1000 seed weight were observed.

1183 YAMADA, I. & EBARA, K.
(Studies on the fertilization of red clover by bees).
Hokkaido Nogyo Shikenjo Hokoku/Rep. Hokkaido Agric. Exp. Sta. 1952 : No. 45 : Pp. 33. [Japanese].

The principal bees fertilizing red clover in Hokkaido are *Bombus senilis* and *Eucera sociabilis*. A decline in percentage fertilization was noted if either white or Alsike clover was growing in the neighbourhood of the red clover and flowered synchronously with it.

1184 BONAVENTURA, G.
Ricerche sulle caratteristiche di alcune sementi di trifoglio pratense di provenienza italiana e straniera. **(Researches on the characteristics of some seeds of *Trifolium pratense* of Italian and foreign provenance).**
Nuovo G. bot. ital. 1950 : **57** : 426–52.

Information is provided on the germinability, 100 seed weight and seed size of samples of red clover obtained from a number of stations in Italy and from Rumania and Poland.

1185 GRAHAM, J. H.
Reaction of strains of red clover to *Stemphylium sarcinaeforme*.
Plant Dis. Reptr. 1953 : **37** : 95–96. (Mimeographed).

In tests at the US Regional Pasture Research Laboratory, State College, Pa., no strain was highly resistant to *S. sarcinaeforme*, but differences in reaction among plants of locally adapted strains suggest that isolation of more resistant clones may be possible. In general, the strains could be grouped according to their place of origin, the relatively resistant strains coming from regions where the disease is most severe.

1186 DIACHUN, S. & HENSON, L.
Symptoms of bean yellow mosaic in red clover.
Phytopathology 1953 : **43** : p. 470. (Abst.).

Interclonal differences shown by the red clover Kenland with respect to symptoms produced by the above virus are described.

1187 **Pilgrim Ladino clover adapted in Northeast; seed is being increased.**
What's New Crops Soils 1953 : **6** : No. 2 : p. 21.

Pilgrim, an improved variety of Ladino clover, is described. It gives a high yield, and is expected to prove more suitable for cultivation in the northeast of the USA than common Ladino clover.

1188 BREWBAKER, J. L. & KEIM, W. F.
A fertile interspecific hybrid in *Trifolium* (4*n* *T. repens* L. x 4*n* *T. nigrescens* Viv.).
Amer. Nat. 1953 : **87** : 323–26.

Two hybrids were obtained from reciprocal crosses between colchicine-doubled plants of *T. repens* ($2n = 64$) and *T. nigrescens* ($2n = 32$), with the aid of embryo culture (cf. Abst. 1178). Preliminary data from their progenies indicate probable interspecific homologies between the multiple allelic loci governing intraspecific incompatibilities and leaf markings. It is suggested that *T. nigrescens* may be one of the ancestors of the amphidiploid species *T. repens* ($2n = 32$).

1189 HEIKINHEIMO, A.
Tammiston alsikeapila. **(Tammisto Alsike clover).**
Siemenjulk. Hankkijan KasvinjalosLaitos Tammisto 1950 : 128–30.

A brief account is given of Tammisto Alsike clover, which was derived from the Danish Øtofte strain, and is superior to this in overwintering capacity and resistance to clover stem rot. Its yield is slightly less than Øtofte in first year leys but 15% greater in the second year.

1190 BREWBAKER, J. L.
Oppositional allelism in diploid and autotetraploid *Trifolium hybridum* L.
Genetics 1953 : **38** : 444–55.

Two self-incompatible clones were crossed reciprocally. According to the results of diallel intercrosses, the 19 F_1 individuals studied could be grouped into four intrasterile, interfertile classes of 3, 5, 6 and 5 plants, respectively. The results could be best explained on the basis of an oppositional system of *S* alleles (cf. *PBA*, Vol. XXII, Abst. 2006). In compatible crosses, seed setting ability was influenced by heritable differences irrespective of *S* genotypes. The behaviour of colchicine-induced tetraploids also provided evidence of an oppositional system. Of the 39 heterogenic classes of pollen studied in 4*n* plants, two exhibited an interaction of competition, and were not inhibited in either self or cross pollinations; the remaining 37 classes were inhibited in selfings, showing a dominance interaction (cf. *PBA*, Vol. XVII, Abst. 1393). It is suggested that although

competition among *S* alleles in Alsike clover is relatively infrequent, heterogenic combinations exhibiting such interaction, and the concomitant self compatibility, might predominate in succeeding generations of a $4n$ population, as the result of selective advantage.

1191 Nordenskiöld, H.
An investigation into two tetraploid strains of vetches (*Vicia sativa*) and their hybrid products.
Kungl. LantbrHögskolans Ann. 1952 : **19** : 209–25.

Colchicine-induced tetraploids ($2n = 24$) of two strains showed gigas features and reduced fertility. The tetraploids flowered 1–4 days earlier than the diploids but ripened 7–15 days later. Cultivation of successive generations did not lead to any improvement in seed setting. The seed quality of the tetraploids was inferior to that of the diploids. Meiotic irregularities were observed but no aneuploids were detected among the tetraploids. In lines selected from the hybrid population obtained by crossing the two tetraploid strains, seed yield improved appreciably, although it did not reach the diploid level; pollen fertility showed little improvement. A brief discussion is given of the possibility of obtaining balanced tetraploids of self-fertilized diploid crops by treating the artificial tetraploids with X rays or other mutagenic agents, prior to intercrossing and selection.

1192 Nikolaev, V.
(**A collective farmer and experimenter**).
Kolhoznoe Proizvodstvo (Collective Farming) 1953 : No. 11 : p. 9. [Russian].

Reference is made to a new sainfoin, Tihonenko's Hybrid, bred by a farmer in the Altaï territory, where it yields 13–14 c. seed and 42 c. hay per ha. It has been made a standard in the Altaï and is under trial in the Kazah SSR and the Sverdlovsk and Čeljabinsk provinces.

1193 Noordhoff, L. J.
Rowan is the beginning of better lespedezas.
Sth. Seedsman 1953 : **16** : No. 11 : 21, 45, 63.

The new Korean lespedeza Rowan (cf. *PBA*, Vol. XXII, Abst. 481) has outyielded other commercial varieties in North Carolina and also proved superior for grazing purposes. Crosses between Rowan and later maturing varieties from Asia have been effected, and should result in even heavier yields.

1194 Wells, J. C., Hanson, C. H. & Allison, J. L.
The reaction of Rowan, Korean and Kobe lespedeza to root-knot nematode species.
Plant Dis. Reptr. 1953 : **37** : 97–100. (Mimeographed).

Rowan (cf. *PBA*, Vol. XXII, Abst. 481) was found to be highly resistant to *Meloidogyne incognita*, and *M. incognita* var. *acrita*, and susceptible to *M. arenaria*, *M. hapla* and *M. javanica* in tests in North Carolina. Korean and Kobe were susceptible to all the species. In view of its resistance to *M. incognita*, the most common species in the southern United States, Rowan should prove valuable as a source of resistance in breeding.

1195 Fedotov, V. S.
(**The white lupin and prospects of its cultivation in the USSR**).
Trud. Prikladnoĭ Bot. Genet. Selekcii (Bull. Appl. Bot. Pl.-Breed.) 1948 : **28** : No. 1 : 77–90. [Russian].

The forms of *Lupinus albus* from the collection of the Institute of Plant Industry include Georgian, Mediterranean, Central European and Palestinian types, which are regarded as promising in breeding the lupin for edible seeds or as forage or green manure crops.

1196 Shimizu, A.
(**Studies on the root nodules of the lupin**).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 100–02. [Japanese].

In *Lupinus luteus*, bacterial nodule formation is accompanied by cell division with normal mitoses (cf. Abst. 1525).

1197 D'Oliveira, B.
Nota sobre a especialização fisiológica do *Uromyces renovatus* Syd. (**Note on the physiological specialization of *U. renovatus* Syd.**).
Broteria 1952 : **22** : 131–37.

Four physiological races of *U. renovatus* pathogenic to lupins in Portugal have been differentiated but more exist. Differences in susceptibility among species and strains of lupin are noted.

1198 Boutique, R.
Espèces nouvelles du genre *Lotus* L. (Papilionaceae). [**New species of the genus *Lotus* L. (Papilionaceae)**].
Bull. Jard. bot. Brux. 1953 : **23** : 233–35.

Three new species, discovered in the Belgian Congo, are described. *L. lebrunii* is found in

the vicinity of Lake Albert, at heights of *ca.* 2400 m. It has a creeping habit and grows on rocky soils. *L. becquetii* grows on pasture land at a height of *ca.* 2000 m. in the area of Ruanda-Urundi. *L. subdigatus* was discovered in the district of Haut-Katanga, at a height of *ca.* 1800 m.

ROOTS AND TUBERS

1199 Blaim, K.
Przyczynek do poznania biochemii "pośpiechów" u buraków. (**A contribution to the knowledge of the biochemistry of bolters in beets**).
Roczn. Nauk rol. 1953 : Ser. A : **66** : No. 4 : 85–94.

A biochemical study was made of the metabolism of sucrose in the leaf of normal and of bolting mangels.
It was found that in normal roots, at a certain stage of development in August, the synthesis of sucrose predominates over hydrolysis, but in bolters this relation is reversed. These results confirm the findings of Tolmačev, Chroboczek and Rosnowski on the connexion between vernalization of beet seed and the occurrence of bolters. A suggested theoretical explanation of the biochemical results is given, similar to that advanced by Oparin to elucidate the invertase relations of spring and winter wheats.

1200 Waterson, H. A.
Fodder beet in the west of Scotland 1950-1952.
Bull. W. Scot. Agric. Coll. 1953 : No. 149 : Pp. 15.

A report is given of trials of forage beet varieties carried out at Auchincruive and on farms in the west of Scotland during the period 1950–52. The following varieties were tested: Eldorado mangel, Gul Dæno X [Yellow Dæno X], Rød Øtofte X [Red Øtofte X], Pajbjerg Rex X and Hunsballe X intermediate and high dry matter fodder beets and Webb's fodder sugar beet. A classification of approximately 20 British and continental varieties on the basis of dry matter content is included.

1201 Brummer, V.
Rehusokerijuurikkaan viljelyarvosta ja siihen vaikuttavista tekijöistä. (**On the cultivation value of fodder sugar beet and the factors affecting it**).
Siemenjulk. Hankkijan KasvinjalosLaitos Tammisto 1950 : 147–56.

Trials of several strains of Finnish and Scandinavian fodder sugar beets are described. Preliminary investigations into the possibilities of mechnical harvesting after removal of the tops have also been made, and short-rooted strains, with conical roots, have proved best. The so-called high-percentage strains are less satisfactory.

1202 Iwasa, S.
(Studies on artificial triploid and hexaploid *Brassica* types having the three genomes abc).
Kyushu Daigaku Nogakubu Gakugei Zasshi/Sci. Bull. Fac. Agric. Kyushu Univ. 1951 : **13** : 90–99. [Japanese].

Triploid plants with the genome constitution abc were obtained by crossing *B. carinata* 'A' and 'Cadisabeba' (bbcc) with *B. pekinensis* 'Kashin' (*aa*). Hexaploids of constitution aabbcc were produced by colchicine treatment of the abc triploids and by crossing tetraploid strains of the *B. carinata* and *B. pekinensis* varieties.
The trigenomic types were, in general, morphologically intermediate between the parents. The chromosome numbers were, as expected, $2n = 27$ and 54. Fertility was low in the triploids, and fair in the hexaploids.

1203 Iizuka, M.
(Studies on the fertility of artificial polyploid plants. I. The relation between age of flower and fertility in *Brassica* and *Raphanus*).
Kyoto Daigaku Shoturyo Kagaku Kenkyusho Hokoku/Bull. Res. Inst. Food Sci. Kyoto Univ. 1951 : No. 7 : Pp. 25. [Japanese].

Seed set was investigated in $2x$ and $4x$ strains of *B. pekinensis* 'Kashin,' *B. rapa* 'Tokinashi' and *R. sativus* 'Minoyonbai' after pollination at various times after the opening of the flowers. The $2x$ strains set more seed than the $4x$ derivatives; the decrease in fertility following pollinations made at the longer intervals after the opening of the flower was greater in $4x$ strains of *Brassica* than in $2x$ strains, but the reverse occurred with $4x$ and $2x$ strains of *Raphanus*. The decline in seed set with lapse of time after flower opening especially affects the ovules farthest from the stigma; this effect was most noticeable in the $4x$ strains.

1204 Josefsson, A.
Tetraploida rovor, förädling och försök vid Sveriges Utsädesförening. (**Tetraploid turnips; breeding and trials by the Swedish Seed Association**).
Sverig. Utsädesfören. Tidskr. 1953 : **63** : 165–80.

Swedish research on tetraploid turnip breeding is outlined and the tetraploid Sirius turnip, a

Svalöf selection derived from a bulk cross between tetraploid families of Bortfelder, Yellow Tankard and Östersundom, is described. High yields were recorded from tetraploid stocks in comparative trials, in which Sirius gave 29% more dry matter than Svalöf Yellow Tankard and 15% more than Svalöf Östersundom. On the other hand, the tetraploids had a lower dry matter content than the parent lines and their crude protein and ash contents and their yield of tops were also lower. The roots of the tetraploids are large, plump and smooth.

The tetraploids have proved less susceptible to *Pseudomonas destructans* and *Ps. campestris* and, in two trials, seem more resistant to *Plasmodiophora brassicae.*

The quality and germination capacity of tetraploid seed, which is larger than ordinary seed, has been good; and, in general, the set has been satisfactory.

Research is in progress to increase the content of dry matter, crude protein and carotene and to improve resistance to club-root and bacterial diseases.

1205 Valle, O.
Kokemuksia naatti-nauriista rehukasvina. (Observations on turnip tops as fodder plants).
Maatalous ja Koetoim. 1952 : No. 6 : 49–61.

This report on experiments carried out in 1951 into the fodder value of turnip tops gives comparative data for the English varieties Green Globe and Norfolk.

1206 Maliani, C.
Nel cuore della produzione tedesca di nuove varietà di patate da semina. (In the heart of the German production of new varieties of seed potatoes).
G. Agric. Domen. 1953 : **63** : p. 285.

A general account is given of potato breeding in Bavaria, by the Weihenstephan institute and various private breeders. It contains an outline of the operations involved in each of the 10–12 years required to produce a new variety; these include testing for resistance to wart, late blight and virus.

1207 Howard, H. W. & Swaminathan, M. S.
The cytology of haploid plants of *Solanum demissum*.
Genetica 1953 : **26** : 381–91.

Investigations were carried out on two plants with $2n = 36$ derived from crosses of *S. demissum* ($2n = 72$) as female with diploid species ($2n = 24$).

Morphologically, the plants with $2n = 36$ appeared to be haploids of *S. demissum.* The two plants formed an average of 6·59 and 9·78 bivalents per nucleus, respectively. In one plant, a single trivalent was observed in 2 out of the 160 cells examined. A fertile sector with doubled chromosome number was colchicine-influenced in one of the $2n = 36$ plants. Progeny of crosses between this sector and normal *S. demissum* were fully fertile, and formed 36 bivalents at metaphase I. It is therefore concluded that the two plants are true haploids of *S. demissum.* Most probably they resulted from the parthenogenetic development of a normal egg nucleus.

1208 Swaminathan, M. S. & Howard, H. W.
The cytology and genetics of the potato (*Solanum tuberosum*) and related species.
Bibliogr. genet. 1953 : **16** : 1–92.

A comprehensive account of the cytology and genetics of *S. tuberosum* is given, together with data on collecting expeditions and the geographical distribution of potato species. Chapters are included on chromosome numbers and chromosome morphology, meiosis in species and hybrids, haploids and experimentally produced polyploids, interspecific hybridization, sterility, genome analysis, inheritance of resistance to various diseases and pests, including wart disease, late blight and different viruses, inheritance of resistance to low temperatures, inheritance of morphological characteristics, the occurrence of mutations and chimaeras and the chemical composition of the tubers.

1209 Taguchi, K. & Kuriyama, H.
(Cytological and breeding studies on the interspecific potato hybrid Danshaku x Tayamashu).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 181–84. [Japanese].

In Danshaku (= Irish Cobbler), meiosis displays various irregularities, notably trivalents and quadrivalents and the formation of dyads. The form referred to as Tayamashu [Tayama's Seed] is a diploid South American potato received from a Japanese resident in Peru; it is believed to pertain either to *Solanum goniocalyx* or to *S. stenotomum.* Meiosis in this form was normal.

In the F_1 hybrid, the average numbers of trivalents, bivalents and univalents per cell were 8·25, 3·18 and 3·18, respectively. Dyads were formed, rather than tetrads.

Notes are given on the vegetative period, tuber size and number, and incidence of disease in the parent varieties and the hybrid.

1210 SCHULZE, E.
Keimförderung bei Kartoffeln durch "mechanische" Einwirkung. (**Inducing germination in potatoes by "mechanical" treatment**).
Kartoffelbau 1953 : **4** : 272–74.

A further account is given of ways of reducing the period of dormancy in potatoes by mechanical treatment (cf. *PBA*, Vol. XXIII, Abst. 2779). By destroying the cork layer under the skin of the tuber, the growth-inhibiting substances in the skin are prevented from interfering with the growth hormones in the tuber itself.

Early varieties react best to treatment when fully mature, but medium and late varieties are not influenced by the degree of maturity. The optimum temperature for germination lies between 25 and 28° C, the varieties Bona, Robusta, Suevia, Havilla, Benedikta, Heimkehr [Home coming] and Roswitha being especially impeded in their germination by temperatures above or below this optimum.

1211 ZADINA, J.
Využití nekvetoucích a bobule nenasazujících odrůd bramborů ve šlechtění. (**The use of potato varieties bearing no flowers or berries as breeding material**).
Sborn. čsl. Acad. Zeměd. 1953 : **26** : 347–56.

Grafting potatoes on tomatoes and growing the material under Dutch lights induced flowering in some varieties and forms. Berry setting was improved by the use of various growth substances or sugar solutions and by pollination with pollen mixtures, including the pollen of rye and poppy besides potato pollen. The incompatibility between some domestic varieties and wild forms has been overcome by vegetative rapprochement.

1212 MALINOWSKI, E., BAŃKOWSKA, H. & OSKIERKA, I.
Potato grafting experiments. II. Grafting of *Solanum Rybini* onto tomato stocks.
Bull. Int. Acad. Pol. Sci. Cracovie 1951 (1952) : 361–68.

A self-incompatible strain of *S. rybinii*, grafted on tomato stocks without lateral shoots, produced seeds when selfed under controlled conditions.

1213 ZITZEWITZ, A. VON
Steigerung des Stärkeertrages. (**Increasing the starch yield**).
Kartoffelbau 1953 : **4** : 244–45.

Experiments conducted with 13 potato varieties during 1952 and 1953 showed that Hochprozentige [High Percentage], Carmen and Vertifolia gave the highest two-year average yield of starch per given area.

1214 POHJANHEIMO, O. & SIMOLA, P.
Eräistä perunan makuun vaikuttavista tekijöistä. (**On certain factors affecting the flavour of potatoes**).
Maatalous ja Koetoim. 1953 : No. 7 : 74–82.

Experiments are described in which several Finnish and foreign potato varieties were grown in a number of different localities and soil types and the effect of these conditions on flavour estimated.

1215 POKORNÝ, V.
Korelační vztahy mezi velikostí škrobnatostí a zbarvením bramborových hlíz. (**Correlations between the size, starch content and colour of potato tubers**).
Spisy Přírodovědeck. Fak. Univ. Karlovy 1948 : **194** : 109–12.

Correlations between the starch content and size or colour of tubers have not been sufficiently high to warrant breeding potatoes for high starch content on the basis of either character.

1216 GERN, A. P.
(**New varieties of potato for processing**).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1953 : No. 9 : 50–53. [Russian].

Oktjabrenok [Little Octobrist] and Promyšlennyĭ [Industrial] are regarded as the best varieties for making starch and alcohol. The starch content, yield and size of Oktjabrenok have been improved in recent years by selection and continuous summer sowing. Promyšlennyĭ, from Rejtan x Oktjabrenok, was superior in starch yield to all other varieties in the 1952 trials and had both the good keeping properties of Wohltmann and the productiveness of Lorh.

1217 **New potato varieties.**
Agric. Gaz. NSW 1953 : **64** : p. 464.

Two new potato varieties released by the Department of Agriculture, New South Wales, are described. Crana, an early-maturing variety, possesses good field resistance to brown fleck and mosaic disease and produces round tubers of uniform size with good keeping and cooking qualities. It should prove of value to coastal growers as an early red variety.

Awaba is a late maturing variety with good resistance to early and late blight and common scab. Keeping and cooking qualities are good, and the tubers are of uniform size and free from growth cracks.

1218 Uspenskiĭ, E. M. & Skibnevskaja, N. N.
(Methods of potato breeding).
Selekcija i Semenovodstvo (Breeding & Seed-growing) 1953 : No. 5 : 41–45. [Russian].

Existing practices of raising selfed or hybrid material and the method of selecting one year old plants for high yield and starch content are criticized from the Mičurinite viewpoint and alternative agricultural methods and systems of selection are presented. The claim that some plants with a low starch content or tuber yield in their first year may later outyield others in both respects is supported by some evidence from Moscow and Kiev.

1219 Breitensten, W.
Potatisförädling i Holland. **(Potato breeding in the Netherlands).**
Tidskr. Lantm., Helsinki 1953 : **35** : 151–52.

Scandinavian and Finnish readers are provided with a brief account of (1) the potato breeding facilities in the Netherlands, and (2) the methods used there in breeding for resistance to diseases, eelworm, and Colorado beetle by means of interspecific hybridization.

1220 Perlova, P. L.
(The evolution of species and forms of wild and domestic potatoes in western Pamir).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1953 : No. 4 : Ser. Biol. : 75–86. [Russian].

The results of experiments conducted at the Institute of Plant Industry in the 'thirties and 'forties are revised in the light of Lysenko's recent theories of interspecific conversion. In the original investigations, *Solanum vallis-mexici, S. maglia, S. tenuifilamentum, S. mamilliferum, S. cuencanum* and *S. molinae,* which had shown varying degrees of sterility under Leningrad or Moscow conditions, were planted from tubers in the Pamir, where they developed well and reproduced sexually. Heritable changes observed in these species and forms, including improved tuber production and fertility when selfed or crossed, are described. Formerly they were explained by the effects of the new environment upon the reproductive organs of the plants or by chromosomal mutations, but now they are regarded as due to conversion. *S. vallis-mexici* ($2n = 36$) changed into a new variety, with double chromosome number, designated var. *polyploideum.* Mention is made of various crosses using the latter as the maternal or paternal parent. For instance it crossed readily, under Leningrad conditions, with *S. gibberulosum, S. demissum* and such domestic varieties as Stärkeragis, Katahdin and Centifolia. Under Pamir conditions it crossed with *S. commersonii, S. maglia, S. ciecae,* the new species *S. pamiricum* and the domestic variety Edelhard. High tuber yields were obtained in Leningrad and the Pamir from the hybrid *S. vallis-mexici* x Stärkeragis. *S. maglia* changed into *S. pamiricum,* which has 25 or 26 chromosomes. *S. tenuifilamentum, S. mamilliferum* and *S. cuencanum* gave new forms, with 48 or 50 chromosomes in place of the original 36. These resembled *S. andigenum,* which is regarded as a possible ancestral species. *S. molinae* gave a form bearing undissected leaves similar to, but not identical with, *S. attilum* var. *xanthorichum.*

1221 Boock, O. J.
Variedades de batatinha (*Solanum tuberosum* L.) procedentes da Polônia. [**Varieties of potato (*S. tuberosum* L.) obtained from Poland**].
Bragantia 1951 : **11** : 291–96.

Five Polish varieties were compared with Eigenheimer in morphological features and disease resistance when tested in Brazil. Two of them, Kolobrzeskie and Pionier, were more resistant to *Phytophthora infestans* and *Alternaria solani,* and Pionier was also more resistant to a physiological disturbance referred to as chocolate spot. All were inferior to Eigenheimer in yield.

1222 Conseil d'Administration du jeudi 6 août 1953. **(Administrative council meeting of Thursday 6 August 1953).**
Pomme d. Terre franç. 1953 : **16** : No. 169 : 11–23.

The following information is taken from the above report of the French National Federation of Producers of Seed Potatoes.

At the Trévarez Station, a collection of cultivated varieties and about 80 wild species of potato has been made and the wild forms are being tested for resistance to blight and the presence of virus disease. Hybridization of wild and cultivated varieties is expected to yield breeding material with characters unknown in the cultivated potatoes.

After three years of research, the collection of cultivated varieties has been classified according to resistance to the viruses A, X and Y, and studies of resistance to virus X are being completed.

Comparative trials of more recently acquired varieties are in progress to test (*a*) yield and (*b*) rate of tuber formation.

The suitability of different varieties for Algeria, Morocco, Martinique, North Africa, Switzerland, Greece and Ecuador is being investigated.

1223 RATERA, E. L.
Resistencia a las heladas de algunos *Solanum* (*Tuberarium*) argentinos. [**Resistance to frosts of some Argentine species of *Solanum* (*Tuberarium*)**].
An. Soc. cient. argent. 1947 : **143** : 258–63.

A series of wild Argentine potato species was exposed to low temperatures under field conditions at the Field Station of the Institute of Genetics of the Faculty of Agronomy and Veterinary Science, Buenos Aires. The most resistant species were *S. commersonii* and *S. millanii*.

1224 DEMEL, J. & WENZL, H.
Die Sortenanfälligkeit der Kartoffeln gegen Fadenkeimigkeit. (**Varietal susceptibility of potatoes to spindling sprout**).
Bodenkultur 1953 : **7** : 142–51.

Early varieties tend to be more susceptible to spindling sprout than late varieties. In tests conducted in Southern Austria, drought and high temperatures were found to be the main causes of the disease, which was closely associated with *Colletotrichum* wilt. Of early varieties, Oberarnbacher Frühe [Oberarnbach Early] showed the least tendency towards spindling sprout. The late varieties Agnes and Roswitha were extremely susceptible.

1225 HROBRYH, N. D.
(Silver scurf of the potato).
Bot. Ž. (Bot. J.), Moskva 1953 : **38** : 206–14. [Russian].

At the Institute of Plant Industry, some varieties, and the hybrids Epicure x *S. boyacense*, Kaliban x Tokana x Katahdin, 4441–5 (Voran [Forward] x Erika) and 4445–20 (1620 x m^{40}), showed a high degree of resistance to silver scurf (*Spondylocladium atrovirens*).

1226 NIEDERHAUSER, J. S. & CERVANTES, J.
Races of *Phytophthora infestans* prevalent in central Mexico.
Phytopathology 1953 : **43** : p. 480. (Abst.).

Several isolates of *Ph. infestans* from central Mexico are capable of attacking the differential potato varieties used by Reddick *et al.* in the United States and Black in Scotland. Some cultures have produced marked infection on all clones of *Solanum demissum* so far tested. Evidence has been obtained of the occurrence of a fourth gene for late blight resistance in *S. demissum*.

1227 POHJANHEIMO, O.
Jaakko-peruna. Uusi kotimainen arvokas perunajaloste. (**Jaakko, a new, valuable Finnish potato variety**).
Maamies 1951 : **36** : 281, 286.

Jaakko, a new variety derived from the cross Eigenheimer x Goldwährung [Gold Standard] is described. It matures earlier than either parent, and outyields them both, producing oval-shaped tubers of good cooking quality. Jaakko is immune to wart and fairly resistant to blight.

1228 ZADINA, J.
Šlechtění bramborů na vzdornost proti plísni *Phytophthora infestans*. (**Breeding potatoes resistant to *Ph. infestans***).
Sborn. čsl. Acad. Zeměd. 1953 : **26** : 395–406.

Crosses between a large number of varieties were made, and 5232 hybrids tested for resistance to *Ph. infestans*. No variety, when crossed with Erika, either materially increased or decreased the percentage of resistant individuals in the progeny. The most highly resistant varieties were Erika, Robusta, Kameraz I, II and III, Sandnudel and Fitoftoroustoičivyĭ [Phytophthora Resistant]. Falke [Falcon], Monika and Aquila also showed a good degree of resistance. No correlation of resistance to *Phytophthora* with colour of skin or tuber, resistance to scab and time of maturity could be established.

1229 ZADINA, J.
Biotypy plísně bramborové (*Phytophthora infestans*) a šlechtění bramborů na odolnost proti plísni. [**Biotypes of potato late blight (*Phytophthora infestans*) and breeding for resistance to potato late blight**].
Sborn. čsl. Acad. Zeměd. 1953 : **26** : 569–74.

The *Phytophthora* resistant varieties Aquila, Falke [Falcon], Fridolin and Roswitha were used in studies of 15 strains of potato late blight of different Czech provenance. Six biotypes were identified, none as aggressive as the virulent Polish biotype, which has, however, not yet appeared in Czechoslovakia.

1230 WINKELMANN, A.
Weitere Fundstellen von Biotypen des Kartoffelkrebserregers in Westdeutschland. (**Further sources of biotypes of the agent causing potato wart in Western Germany**).
NachrBl. dtsch. PflSchDienst, Stuttgart 1953 : **5** : 173–75.

The varieties Fram, Hilla, Fortuna and Fontana

proved resistant to biotypes of potato wart occurring in West Germany (cf. *PBA*, Vol. XXIII, Abst. 1302).

1231 Potatiskräftan i Sverige. (**Potato wart disease in Sweden**).
Flygbl. Växtskyddsanst. 1953 : No. 100 : Pp. 8.
This advisory pamphlet includes lists of 23 immune and 24 susceptible varieties of potatoes. The first list contains brief comments on earliness, colour of the skin and flesh, and the use for which the variety is suited. In the second list synonyms are given.

1232 Montaldo B., A.
Fitomejoramiento para resistencia a la sarna polvorienta de la papa. (**Plant breeding for resistance to powdery scab of potato**).
Agricultura téc., Santiago 1951 : **11** : 140–48.
Examinations of a number of Chilean and introduced potato varieties showed most of these to be susceptible to *Spongospora subterranea*; Erie and Tuton from the USA and a certain number of selections from the Centinela experimental station in Chile are classed as resistant.

1233 Wenzl, H.
Weitere Untersuchungen über die "Blattdürre" der Kartoffel als Erscheinungsform der Colletotrichum-Welkekrankheit. (**Further investigations into leaf scorch in the potato as a manifestation of *Colletotrichum* wilt disease**).
PflSchBer. 1953 : **11** : 65–72.
A mild form of *Colletotrichum* wilt disease, termed leaf scorch, was found in eastern Austria. Differences in varietal reaction to the disease are listed.

1234 Keller, E. R.
Alternaria solani, Erreger der Dürrfleckenkrankheit und der Knollenhartfäule der Kartoffeln. (***A. solani*, the pathogen causing dry spot disease and early tuber blight in potatoes**).
Mitt. schweiz. Landw. 1953 : **1** : 188–92.
Tests at the Federal Agricultural Research Station, Zürich-Oerlikon, showed that rough-skinned potatoes were less susceptible than smooth-skinned varieties, and late varieties less than early varieties, to attack by *A. solani*. Bintje and Erstling proved extremely susceptible.

1235 Recherches de pommes de terre résistantes aux doryphores. (**Searching for potatoes resistant to Colorado beetles**).
Pomme d. Terre franç. 1953 : **16** : No. 170 : 13–14.
Some of the work at Rosenhof in Germany is briefly mentioned (cf. *PBA*, Vol. XXIII, Abst. 2801).

1236 Bercks, R.
Fortgeführte Untersuchungen über das Infektionsvermögen verschiedener X-Virusherkünfte gegenüber Kartoffeln. (**Further investigations on the virulence of different virus X strains to potato**).
Züchter 1953 : **23** : 289–93.
Further experiments (cf. *PBA*, Vol. XXI, Abst. 2806) into the differential reaction of potato varieties to infection with virus X are described. Virus cultures taken from Direktor Johanssen, Kaiserkrone [Imperial Crown] and Erstling infected only a comparatively small number of other varieties, and would appear to fall into a special group. Virus taken from Corona, Erdgold [Earth Gold], Flava, Frühbote [Early Messenger], Jubel [Rejoicing] and Prisca infected all varieties.
Ackersegen, Agnes, Aquila, Bona, Capella, Merkur, Mittelfrühe [Medium Early], Sabina, Vera and Voran were not as susceptible to virus X as the other varieties tested.

1237 Sass, M.
Studien über den G-Typ des Kartoffelkrebserregers *Synchytrium endobioticum* (Schilb.) Perc. [**Studies on the G type of the potato wart disease *S. endobioticum* (Schilb.) Perc**].
NachrBl. dtsch. PflSchDienst, Berl. 1953 : **7** : 181–89.
A new race of *S. endobioticum*, which attacks potato varieties hitherto resistant to the disease, has spread in Eastern and Western Germany. The variety Fram and the experimental strain Malchow 2276 are field immune to the new race.

1238 Arenz, B.
Methodische Versuche zur Ermittlung von Resistenztypen bei Y- und Blattrollvirus an 26 Kartoffelsorten. (**Methodical attempts to determine types of resistance to virus Y and leaf roll virus in 26 varieties of potato**).
Züchter 1953 : **23** : 341–46.
The resistance of 26 varieties of potato to virus Y and leaf roll was tested and an attempt made

to discover the types and causes of resistance. Infection of the plants was by means of aphids. The varieties Oberarnbacher Frühe [Oberarnbach Early], Marktredwitzer Frühe [Marktredwitz Early], Forelle [Trout], Bona, Ackersegen, 4429/7 and Aquila were not as susceptible to aphid infestation as the other varieties tested, and may be termed vector resistant.
Jakobi, Forelle and 3821/37 were not infected as readily as other varieties when attacked by aphids carrying virus Y. In 3821/37 and Jakobi the virus spread through the plant to the tubers extremely slowly. In Lori and Ancilla the rate of increase of the virus was less than in other varieties. In the case of leaf roll, the results of investigations into the different types of resistance mentioned above were inconclusive. Of varieties infected with leaf roll, Panther, Robusta, Bona and Jakobi showed the smallest percentage of plants in which the disease had reached the tubers.

1239 Petersson, G. & Svenffon, E.
Rostfläcksjuka på potatis. (**Internal rust spot in potatoes**).
Lantmannen, Stockholm 1953 : **37** : 867–69.
Following investigations in 1950 and 1951 at Ugerup Experimental Farm in Sweden, the incidence of internal rust spot in potato varieties was recorded. Alpha was severely affected and Arran Consul showed a high percentage of diseased tubers.

1240 Bagnall, R. H.
Notes on potato virus A.
Proc. Canad. phytopath. Soc. 1953 : No. 21 : p. 11.
Experiments at the Plant Pathology Laboratory, Fredricton, New Brunswick, showed that the potato varieties Epicure and Craig's Defiance are hypersensitive to viruses A and X. Canso, Katahdin and Irish Cobbler are hypersensitive to virus A. The USDA Seedling 41956 is immune to virus X, but is a symptomless carrier of virus A. The need of combining resistance to both viruses in all varieties intended for commercial use is emphasized.

1241 **Genetics helps plant breeders to produce better potatoes.**
Rur. Res. CSIRO 1953 : No. 5 : 7–11.
An account is given of damage caused by the potato viruses X and Y, and of the development and maintenance in Australia of virus-free seed stocks of a number of commercial varieties. New resistant hybrid varieties are undergoing tests.

1242 Corbett, M. K. & Peterson, L. C.
Unsuitability of mechanical inoculation in determining the field reaction of potatoes to potato virus Y.
Phytopathology 1953 : **43** : p. 469. (Abst.).
Inbred clones either failed to react or developed only local lesions when mechanically inoculated with four strains of virus Y, but when exposed to infection under field conditions, and when inoculated by grafting or by means of aphids, they showed systemic infection.

1243 Timian, R. G.
Identification of seedling potatoes immune to virus X.
Phytopathology 1953 : **43** : p. 487. (Abst.).
In identifying immune seedlings in segregating progenies, mass inoculation with a highly virulent strain of virus X by means of a paint spray gun was found to be effective. Virtually immune selections were secured by mass inoculation before transplanting to the greenhouse bench, followed by hand inoculation after transplanting. Susceptible seedlings developed local necrosis within four days, the optimum temperature for the expression of symptoms being 16°C.

1244 Lunden, A. P.
Valg av potetsort. (**Choice of a potato variety**).
Norsk Landbr. 1953 : **19** : 194–97.
The performance and characteristics of Norwegian and other potato varieties tested in official trials in Norway are reviewed. Yields, quality and disease resistance of table varieties and of industrial and fodder potatoes are discussed.

1245 **New yams outshine old for early market.**
Seed World 1953 : **73** : No. 7 : p. 37.
Earlyport, high-yielding sweet potato, introduced.
Sth. Seedsman 1953 : **16** : No. 11 : p. 52.
The sweet potato Earlyport, developed at the Louisiana Agricultural Experiment Station, has produced three times as many US No. 1 roots as Unit Porto Rico, but has not shown such good storage and processing qualities as the latter variety. The roots of Earlyport have copper-coloured skin and bright orange flesh. The experimental seedling 0–123 has given higher yields of first grade roots than Unit I Porto Rico in tests during 1953.

1246 Poole, C. F.
Onolena—Hawaiian sweet potato.
Hawaii Fm. Sci. 1952 : **1** : No. 2 : 7–8.

Onolena, a new variety of sweet potato developed from a cross between Porto Rico and Nancy Hall, is described. It gives a high yield of good quality roots, stores well and is highly resistant to diseases.

1247 Tjutin, M. G.
(**The sweet potato**).
Priroda (Nature) 1953 : No. 10 : 114–15. [Russian].

Successful crosses between *Ipomoea batatas* and *I. fastigiata* are reported from Suhumi. Good compatibility between the two species is regarded as supporting the hypothesis that the sweet potato originated from *I. fastigiata.* Other theories on the origin of the sweet potato are referred to briefly.

1248 Shibuya, M.
Studies on the varietal resistance of sweet potato to the root-knot nematode injury.
Mem. Fac. Agric. Kagoshima Univ. 1952 : **1** : 1–22.

The varieties Yoshida, Taihaku, Norin [Ministry of Agriculture and Forestry] 2, 5 and 7, Ibaraki 1 and Kyushu 5 and 6 are resistant to *Heterodera marioni.* Resistance to the nematode appears to be due to a chemical substance produced by the plant, and to be a dominant hereditary character.

FIBRES

1249 **Thirty-first Annual Report of the Indian Central Cotton Committee for the year ended 31st August, 1952** : Pp. 87.

Genetics and statistics

Investigations at the Institute of Plant Industry, Indore, have indicated that the Banilla gene li_f for the lintless condition is linked with *Y.* The genes li_a, li_b, li_c, li_d, li_e and li_f are stated to segregate independently of *L, Ne,* P_b, *Lc,* Lc_2, Y_b, *R,* R_2 and R_3. The gene determining the light green form of Jarila (cf. *PBA,* Vol. XXIII, Abst. 2818) was independent of Y_b, P_b, *Ne,* Lc_4, Li_a, R_2 and *L.* Valuable selections have been developed at Surat from hybrids between Asiatic and American cottons. Hybrids between *Gossypium hirsutum* and *G. tomentosum* have shown drought and jassid resistance.

Interspecific hybrids developed at Surat have also been tested elsewhere. At Coimbatore, types 1821 and 2196 were resistant to jassid and blackarm, respectively. At Dharwar, selections 135–Co.2–B 16, BC 134–CW, 117–Co. 2 and KAD 5 were highly resistant to both blackarm and red leaf blight. These cottons are being used in breeding strains adapted to local conditions.

The efficiency of the double lattice design in relation to such factors as plot size and shape, shape of complete and incomplete blocks and degree of soil heterogeneity was further analysed.

Continued study of progenies of *G. arboreum* crosses selected for high and low staple length again confirmed that progenies selected for longer halo length had a significantly lower ginning percentage than those selected for shorter halo length.

Breeding in each state is reported in turn. Additional information on the aims of the various schemes may be found in summaries of previous reports (cf. *PBA,* Vol. XXIII, Absts. 1310 and 2818).

Bombay.

In breeding for the Khandesh tract, strain 197–3, now named Virnar, has been crossed with long-staple *G. arboreum* varieties to increase its staple length.

In the Surat area, the wilt-resistant strain 2087 is being multiplied to replace Suyog and 1027 ALF (cf. Abst. 1270).

Further improvement of the Wagad cotton Kalyan by hybridization is under way.

At Amreli, CJ 73 exhibited a general superiority over Pratap, the variety developed to replace the Mathio mixture. Selections from crosses of Pratap with *G. arboreum* cottons from Coimbatore were promising.

Laxmi maintained its superiority over Gadag 1.

In variety trials of perennial cottons, only Moco combined good yield of lint with satisfactory halo length and other economic characters. Hybrids of perennial cottons with *G. hirsutum* annuals yielded better than those with the Sea Island type V 135; on all kinds of soil the hybrids involving Co. 4 gave the highest yields.

Punjab

In local cotton breeding for the southeastern districts, progenies from crosses of M 60 A 2 and 231 Rosea with *G. arboreum* strains such as H 420 and 197–3 gave a good performance.

In American cottons, some complex hybrid progenies equalled 216 F in early maturity and yield of seed cotton, and were superior in ginning outturn and spinning properties. One set of parents of the hybrids consisted of crosses of AC 45, AC 47 and AC 48 with derivatives from the cross 45 x LSS. AC 50, AC 51 and AC 53, from crosses of Punjab-American types and wild strains from the United States, formed the other set.

Selections with a staple length exceeding 1 in. have been obtained from crosses of Punjab-American cotton with long staple varieties of *G. hirsutum* or with Egyptian varieties.

Madras

Strain Rayalseema 1 is being multiplied to replace the Mungari type.

Selection 3870 IV/1–1–3 showed promising fibre properties but did not exceed Westerns–1 in yield.

In a trial of cottons of the Cocanadas type, strains 336–B, RH 25 and Cocanadas 1 were again superior. Among hybrids from crosses of 336–B with Manipur Khaki and other coloured varieties, 336 D 3–2–1–3 and 336 D 2–3–46 appeared to be valuable.

Under irrigated conditions at Siruguppa, the Cambodia type G 1 x Co. 2–9–3 repeated its good performance; in addition, the interspecific hybrids 125 x Co. 2 and 170 x Co. 2, and three Parbhani strains showed promise. Valuable material has also been obtained in breeding unirrigated Cambodia at Periakulam.

Hybrids were selected in the scheme for improving Tinnevelli and Karunganni cottons.

Progress has been made in breeding long-staple American cotton to be used as a winter crop in the central districts of Madras. In trials in cultivators' fields, the new strain Madras Uganda 2 gave a higher yield of seed cotton than Uganda 1. In trials under the scheme for producing long-staple cottons, the hybrid strains 0511–F4, 9030 and 0484–A1 were superior to Madras Uganda 1 in fineness and staple length, and equal to it in ginning outturn.

Madhya Pradesh

New strains of local and American cottons gave good results.

Assam

Selections of local short-staple cotton showed promise. A survey of cottons grown in the different districts of Assam has been initiated (cf. Abst. 1267).

Hyderabad

Progress is reported in the development of improved strains for the Parbhani area.

Mysore

Compared with other Mysore-American cottons and Co. 4, MA 5 maintained its superiority, combining high yield, long staple and good ginning outturn.

Rajasthan

Several new strains showed promise for Mewar.

Madhya Bharat

Work on breeding varieties for Malwa continued at the Institute of Plant Industry, Indore. The scheme for Nimar cotton aims at the development of strains combining the yielding capacity of the local variety with the ginning percentage, spinning performance and wilt resistance of Jarila. In a trial of news trains, D 46–5 maintained its superiority.

1250 Knight, R. L.
Breeding Sudan cottons.
Emp. Cott. Gr. Rev. 1954 : **31** : 1–11.

This article deals chiefly with breeding for resistance to blackarm, leaf curl and jassid. Several other projects are also briefly described (cf. *PBA*, Vol. XXIII, Abst. 2817).

1251 Bigi, F.
Recenti sviluppi e prospettive della cotonicoltura in Somalia. (**Recent developments and prospects of cotton cultivation in Somaliland**).
Riv. Agric. Subtrop. 1953 : **57** : 295–319.

A general account of the development of cotton growing in Somaliland includes reference to an improved strain of Sakellaridis, selected by G. Scassellati Sforzolani, which has done well in irrigated areas. For cultivation without irrigation the only cottons that have proved at all suitable are certain Upland varieties from the USA and Uganda.

1252 Lochrie, J. V.
The Empire Cotton Growing Corporation in the British West Indies.
Emp. Cott. Gr. Rev. 1954 : **31** : 27–31.

The variety problem in the Leeward group of islands is discussed (cf. *PBA*, Vol. XXII, Abst. 2841). Market prospects are still too obscure to permit a clear-cut decision as to whether to grow MSI or VH 8 cotton in Antigua and Nevis. Seed supplies of VH 8 are being maintained and breeding work on this variety is being continued.

1253 Simpson, D. M. & Duncan, E. N.
Stability of cotton varieties.
Agron. J. 1953 : **45** : 448–50.

In experiments on the varieties Coker 100-Wilt, Acala 5675, Empire 9 and Cobal at the Tennessee Agricultural Experiment Station, no important genetic changes occurred during five generations of multiplication, without selection or roguing, under assured conditions of field isolation and separate ginning. Any rapid deterioration of a cotton variety is therefore probably due to varietal contamination and seed mixing at the gin.

1254 Boza Barducci, B.
La producción de algodón en el Peru. (**Cotton production in Peru**).
Agronomía, Lima 1953 : **18** : No. 74 : 9–23.

This lecture has already been referred to in Abst. 455.

1255 Turner, J. H. (Jun.).
A study of heterosis in Upland cotton. 1. Yield of hybrids compared with varieties.
Agron. J. 1953 : **45** : 484–86.

In tests of 21 hand-produced F_1 hybrids developed from crosses among seven inbreds at the Georgia Coastal Plain Experimental Station, Tifton, six hybrids in 1949 and one in 1950 gave significantly higher yields of seed cotton than the control varieties. The best hybrid, Fla. Green Seed (F_8) x Watson's Dixie Triumph (T_2), gave increases of 22·5 and 31·8% in 1949 and 1950, respectively. Boll number was more important than size in determining yield. It is emphasized that combinations superior in yield to adapted varieties are uncommon. After screening 492 hybrids, in 1947, only four combinations with superior yielding ability were found. These hybrids involved the seven inbreds used as parents in the investigations now reported.
Certain inbred lines may present problems, such as the green fuzz of F_8, and the shedding of the bracteoles before boll opening in Bractlet Mutant, one of the parents of the second highest yielding hybrid. Such characters would require elimination by further breeding.

1256 Turner, J. H. (Jun.).
A study of heterosis in Upland cotton II. Combining ability and inbreeding effects.
Agron. J. 1953 : **45** : 487–90.

Combining ability and the effects of inbreeding were studied in 1950, using the seven inbreds already found to give superior hybrids (cf. Abst. 1255). The 21 possible combinations were grown in family blocks of the F_1 and F_2 hybrids with the P_1 and P_2 inbreds. Specific combining ability was evidently more important than general combining ability in determining yield of seed cotton. The degree of heterosis, as shown by the increase of the F_1 over the parental mean, was much higher for boll production and yield of seed cotton than for other yield components. Reduction in vigour due to inbreeding was largely of a linear order for the seven characters studied. The differences shown by the hybrids in response to inbreeding were mainly attributable to the manner in which the inbreds were combined. It is postulated that the more productive hybrids resulted from the crossing of lines having the same flowering season but differing widely in their periods of boll setting.

1257 Meyer, J. R.
Species, the raw material for future cottons.
Circ. Miss. agric. Exp. Sta. 1952 : No. 172 : Pp. 7.

It is suggested that by hybridization the Asiatic cultivated cottons and the American wild species offer opportunities of improving American Upland with respect to the following: several lint properties; reduction of bract trash, by incorporating the type of extremely smooth leaves, shown by derivatives of hybrids involving Upland and *Gossypium armourianum*; resistance to insects and diseases; resistance to the herbicidal oils used in weed control; early maturity; and yield.

1258 Gerstel, D. U.
Chromosomal translocations in interspecific hybrids of genus *Gossypium*.
Evolution 1953 : **7** : 234–44.

Hybrids between *G. arboreum* and *G. herbaceum* formed 11 bivalents and a ring or chain of four chromosomes at mitotic metaphase. Hybrids between *G. arboreum* and *G. anomalum* also exhibited one figure of four chromosomes in many cells. *G. anomalum* x *G. herbaceum* hybrids produced only bivalents, or bivalents and univalents. In hybrids between *G. hirsutum* and *G. herbaceum* the most frequent type of metaphase conjugation was $2_{II} + 9_{IV} + 13_I$; *G. hirsutum* x *G. arboreum* hybrids usually formed $1_{VI} + 1_{IV} + 8_{II} + 13_I$; the two interspecific hybrids therefore differed by one translocation. These results are compared with those of other investigators; some phylogenetic speculations are briefly discussed in the light of the formation of translocations.

1259 Kohli, S. P.
A mass selection experiment for cotton improvement.
Indian J. Genet. 1952 : **12** : 69–77.

Mass selection methods resulted in the elimination of unfavourable gene combinations and in an improvement in quality and fibre length of the 298 F/K 25 variety of Upland cotton, widely grown in the Punjab.

1260 Thies, S. A.
Agents concerned with natural crossing of cotton in Oklahoma.
Agron. J. 1953 : **45** : 481–84.

Three species of bumble bee, *Bombus americanorum*, *B. fraternus* and *B. auricomus*, were found to be chiefly responsible for cross pollination

in experiments at Stillwater, Okla. Wind was of no importance. The bees visited the flowers from sunrise to approximately 1.0 p.m., the peak of the population being reached between 9.0 and 10.30 a.m. The foraging habits of the three different species varied, but at times individual bees of any species visited up to 200 flowers before returning to their nest. For a five-day period, the average number of visits per flower per day was 44·9. A small isolated 10-row block containing 195 open flowers was completely visited within two hours. The bees carried dye particles for at least 35 feet.

1261 Stephens, S. G. & Finkner, M. D.
Natural crossing in cotton.
Econ. Bot. 1953 : **7** : 257–69.

A discussion is given on the significance of natural crossing in current techniques of cotton breeding, and in the possible development of new methods, viz. use of F_1 hybrid seed, and multiplication of mechanical mixtures of strains under conditions of a high degree of natural crossing (cf. *PBA*, Vol. XIX, Abst. 1109). It is suggested that open-pollinated populations in small isolated plots, segregating for several appropriate marker genes, may provide a more suitable method of estimating the amount of natural crossing than mechanical mixtures of homozygous stocks consisting of the genotype *RR* for red seedlings and *rr* for green seedlings. The advantage of using segregating populations lies in the possibility of neutralizing three possible sources of bias: chance genetic differences between stocks; linkage of genes with the seedling markers; and pleiotropic effects of the markers themselves. Experimental data have been obtained indicating that differences between stocks in respect to natural crossing are of practical significance.
It is pointed out that the effective bee population, defined as the ratio of the number of bees to the number of flowers in a given area, is the most generally important factor determining natural crossing. A technique for the rapid estimation of the effective bee population in any field of cotton, irrespective of its genetic composition, is described; it involves the distribution of a finely powdered dye by the bees during flower visitation. It has been found that the effective bee population can vary considerably during the flowering period, and may be lowest during the period of maximum flower production. The effective population may be further modified by bee discrimination between species and possibly also between varieties of a single species.

1262 Shibuya, T. & Sato, H.
(Embryological studies on the formation of abortive seeds or motes in cotton).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 210–14. [Japanese].

The incidence and causes of mote formation were investigated in naturally and artificially pollinated flowers of the Upland variety King's Improved and the oriental variety Kanto 10. Relatively unimportant causes of mote formation were defective ovules and failure of the pollen tube to effect fertilization; most motes resulted from defective development of the fertilized embryo. Small differences were noted between the two varieties in the relative distribution of motes within the bolls.

1263 Crowder, L. V.
Dormancy of Upland and American-Egyptian cottonseed.
Agron. J. 1953 : **45** : p. 454.

In germination tests at the US Field Station, Sacaton, Ariz., evidence was obtained of a dormancy requirement in Upland cottons but not in American-Egyptian varieties.

1264 Nanjundayya, C.
Technological reports on standard Indian cottons 1952.
Technol. Bull. Indian Cott. Comm. 1953 : Ser. A : No. 82 : Pp. 98.

The methods of testing employed in choosing varieties for the standard list of cotton varieties are described, and detailed data on the standard varieties are presented. In the 1951–52 season, Vijay, Virnar, H 420 and Karunganni 2 were added to the standard list of approved varieties, and Cambodia Co. 3 was removed.

1265 Gadkari, P. D. & Ramiah, K.
Further studies in the genetics of Punjab hairy lintless.
Indian J. Genet. 1952 : **12** : 39–49.

The effects of the lintless gene li_c were studied. Whether the genotype $li_c\ li_c$ becomes lethal depends upon environmental factors, total absence of viability being observed at Lyallpur and full germination at Indore. Poor soil reduces the viability of the lintless genotype to a greater extent than that of normal plants.

1266 Al Tubji, H. 'A.
(Wild and cultivated cottons. Their classification, distribution, interrelationships, origin and evolution).
'Ulum Zira' (Agric. Sci.), Cairo 1950 : **1** : 75–107. [Arabic].

Recent work on the taxonomy of wild and

cultivated cotton is reviewed, together with its application to current breeding problems.

1267 De, B. & Ganguli, P. M.
Cotton in Assam.
Indian Cott. Gr. Rev. 1953 : **7** : 202–29.

The article includes a discussion of the classification and evolution of botanical varieties of *Gossypium arboreum* in Assam, with reference to the literature and a study of samples collected from the different hill districts and grown at the Cotton Research Station, Garo Hills. The crop consists mainly of vars. *cernuum* and *neglectum* f. *bengalensis*, and is generally very coarse and short. The distribution of the two varieties suggests that they evolved from a common perennial stock. Descriptions are given of some of the cultivated varieties; Garo Hill cotton is the most commercially valuable and also offers the maximum scope for selecting for high yield, high ginning percentage and coarseness.

1268 Manev, J.
(The standardization of cotton varieties in Macedonia on the basis of varietal trials).
Zborn. Zemjod.- Ispit. Inst. Skopje/Ann. Agric. Res. Inst. Skopje 1952 : **1** : 339–86. [Macedonian].

Most varieties tested have yielded more seed and fibre than the local population. A Russian variety, introduced from Bulgaria, proved the most productive in the Skopje and Tikveš districts, and an American variety gave the highest yield in trials in the Strumica district. The latter variety is interesting for the length and quality of its fibre and has given the highest ginning percentages in all districts. Two Bulgarian varieties and Skopje 23, obtained by single plant selection of a Macedonian population, were noted for their earliness.

1269 Wiles, A. B.
Reaction of cotton varieties to *Verticillium* wilt.
Phytopathology 1953 : **43** : p. 489. (Abst.).

Among the varieties of *Gossypium hirsutum* tested, Smith 81–14, Auburn 56, Alabama Hybrid 257–202 and Hartsville showed most resistance to inoculations of *V. albo-atrum* at the seedling stage. Selfed progenies of surviving plants of these four varieties showed a more uniform resistance than the parents. *G. hirsutum* varieties were however less susceptible than *G. barbadense* and *G. arboreum* cottons.

1270 Patel, G. B. & Bhat, N. R.
Strain 2087, a new wilt resistant cotton for the Surat tract.
Indian Cott. Gr. Rev. 1953 : **7** : 230–32.

Strain 2087 [Vijay x (1027 ALF x Vijay)] has the advantages of *Fusarium* wilt resistance, earliness and superiority in yield and fibre quality compared with Suyog (1027 ALF x 1ALB). The replacement of both Suyog and 1027 ALF by strain 2087 in the whole of the Surat tract in Bombay State is to be undertaken.

1271 Friederich, J. C.
Rassenkeuze bij vezelvlas en factoren, die opbrengst en kwaliteit van het strovlas kunnen beinvloeden. **(Varietal choice in the case of flax and factors that may affect the yield and quality of the straw).**
Versl. Inst. landb. Onderz., Wageningen 1952 : 143–47.

In these trials the best yield of straw was obtained from Formosa and Diana, while Solido, Concurrent [Competitor] and Wiera gave the best yield of seed. The new varieties, bred at the Engelum Station, Noblesse [Nobility], Engelum 51–VII and Solido, had a high long fibre content. As regards long fibre quality, Fivel came first, with Concurrent and Verum as the next best.

One of the new selections, Hylkema 1871, was only slightly attacked by rust and scorch, to both of which Diana and Verum are highly resistant.

A new type of threshing screen and a new threshing machine have been devised which eliminate cracking or fracturing of the seed.

1272 Malyh, P. V. & Kločkov, V. N.
(New varieties of fibre flax).
Selekcija i Semenovodstvo (Breeding & Seed-growing) 1953 : No. 5 : 51–55. [Russian].

Recent standards and the new varieties Severjanin [Northerner], T–5 and Litovskiĭ 230 [Lithuanian 230], which are still under trial, are described. I–7, selected from a land variety at the Flax Institute, is a productive midseason type showing resistance to drought and *Fusarium*. I–9, from 1288_{12} x Prjadiljščik [Weaver], outyields Svetoč [Torch] in White Russia and the Vitebsk province. It is a vigorous midseason variety with indehiscent boll and shows resistance to lodging. L–1120, a late type bred at Smolensk from B–130–2 x A 2176, shows resistance to lodging and fungi. Vaižgantas was obtained by single plant selection from local material at the Lithuanian State Breeding Station. It is late in reaching maturity, but is productive and shows resistance to rust. In preliminary trials, the new varieties Severjanin, bred from I–2 x V 1143 at the Flax Institute, T–5, developed at Tomsk, and Litovskiĭ 230 developed at the Lithuanian

Breeding Station, yielded more seed and fibre than the respective standards.

1273 Flor, H. H.
Epidemology of flax rust in the North Central States.
Phytopathology 1953 : **43** : 624–28.

The occurrence of physiological races of rust (*Melampsora lini*) during 1931–1951 was studied by means of differential flax varieties. Previous investigations have indicated that for each gene for resistance in the host a specific gene for virulence exists in the pathogen; resistance has been found to be invariably dominant, whereas virulence, except on the flax Williston Brown, has proved recessive; the number of pairs of recessive genes demonstrated in each race of the rust fungus is therefore equal to the number of differentials it attacks, ± 1, according to the reaction of Williston Brown (cf. *PBA*, Vol. XVII, Abst. 767 and Abst. 1700). The survey has shown that the flax varieties cultivated largely determined the prevalence of different races. During each successive period, a decrease occurred in the proportion of isolates carrying genes for virulence with no survival value since they differed from those responsible for virulence upon the commercial and experimental varieties grown. Thus, the most prevalent races during different periods were those carrying the least number of recessive genes compatible with survival.

1274 Houston, B. R. & Knowles, P. F.
Studies on *Fusarium* wilt of flax.
Phytopathology 1953 : **43** : 491–95. (Abst.).

In connexion with the development of resistant varieties, greenhouse methods of inoculating flax with *F. oxysporum* f. *lini* were investigated in relation to temperature, soil type, maintenance of natural clones of the pathogen and other factors. By means of six differential varieties, it was demonstrated that pathogenic races occur in California. Evidence of intravarietal heterogeneity with respect to resistance was obtained, Dakota showing the greatest range of variation.

1275 Rataj, K.
Zkoušení odrůd lnu na vzdornost proti anthraknose a fusariose. (**Examination of flax varieties for resistance to anthracnose and *Fusarium***).
Sborn. čsl. Acad. Zeměd. 1953 : **26** : 407–14.

No varieties immune to anthracnose were found. A high correlation existed between resistance to *Fusarium* and resistance to frost. The varieties Šumperský Textilák [Šumperský Spinner], Šumperský jemny [Fine Šumperský] and Šumperský Horal [Šumperský Mountaineer] are resistant to both *Fusarium* and frost, and should prove valuable for breeding purposes.

1276 Knowles, P. F. & Houston, B. R.
Resistance of flax varieties to *Fusarium* wilt.
Agron. J. 1953 : **45** : 408–14.

In studying the resistance of flax varieties to *F. oxysporum* f. *lini*, tests have been carried out under field conditions in California, and also by means of clones of the fungus, i.e. single spore isolates kept pure by continued selection. Of the 222 varieties tested, 22, mostly from the United States, were highly resistant in all tests. None of the varieties from Asia and north Africa were highly resistant. Some varieties showed considerable heterogeneity for wilt resistance, as shown by the behaviour of their single plant progenies. Use of clones of the wilt organism under greenhouse conditions is considered to have many advantages over tests on naturally infested soil.

1277 Mezzetti-Bambacioni, V.
Un esemplare di *Cannabis indica* Lam. fisiologicamente ♂, morfologicamente ♀. (**A specimen of *C. indica* Lam. which is physiologically ♂ and morphologically ♀**).
Nuovo G. bot. ital. 1952 : **59** : p. 480.

A male hemp plant from the Portici Botanic Garden is described as having the growth habit of a female.

1278 Danell, N.
Hampan—en viktig gröda för våra myrjordar. (**Hemp, an important crop for our bog lands**).
Beten, Vallar, Mossar 1953 : **5** : 14–16.

Reference is made to the advances in breeding monecious hemps for increased yields in Sweden (cf. Abst. 141).

1279 Illičevskiĭ, S.
(**Wild hemp in the lower Dnepr districts**).
Bot. Ž. (Bot. J.), Moskva 1953 : **38** : 251–52. [Russian].

A new hemp, designated *Cannabis ruderalis* var. *ucrainica*, has been found in the southern Ukraine. It is resistant to drought and shows promise as a fibre-producing plant. Its introduction as an oil plant is difficult on account of its uneven maturity and susceptibility to shedding.

1280 Sarma, M. S. & Datta, R. M.
Complex chromosome mosaics and variable microsporocytes in *Corchorus capsularis* Linn.
Sci. & Cult. 1953 : **19** : 202–03.

The anthers of a round-leaved type have been found to contain a mixture of hypoploid and hyperploid cells, in addition to cells with the normal number of 7 bivalents. Dyads, with a variable number of nuclei, were frequently formed in the same anther as tetrads; triads also occurred but less frequently. Laggards resulted in the formation of micronuclei.

1281 Srinath, K. V. & Kundu, B. C.
Cytological studies of pollen-tube growth in reciprocal crosses between *Corchorus capsularis* Linn. and *Corchorus olitorius* Linn.
Cytologia, Tokyo 1952 : **17** : 219–23.

Studies of pollen growth were undertaken in view of the incompatibility between the above two species. The rate of growth of the pollen tubes was similar in selfed *C. olitorius* and in *C. olitorius* ♀ x *C. capsularis* ♂. In selfed pollinations of *C. capsularis* and in the mating *C. capsularis* ♀ x *C. olitorius* ♂, rate of pollen tube growth also showed no differences. Reciprocal crosses differed slightly; the grains of *C. capsularis* germinated earlier on the broader stigma of *C. olitorius* than in the reciprocal mating; differences in the time taken for the grains to reach the style base were in conformity with the ratio of the style lengths. In neither cross was incompatibility due to retardation of pollen tube growth in the style.

1282 Pate, J. B.
Resistance in kenaf to *Colletotrichum hibisci.*
Phytopathology 1953 : **43** : 647–48.

Lines of *Hibiscus cannabinus* highly resistant to *C. hibisci* have been developed by pure-line selection within the variety El Salvadorian at the Everglades Experiment Station, Belle Glade, Fla. Methods used in testing for reaction to the fungus are described. Lines showing complete susceptibility or intermediate degrees of resistance have also been isolated. The genetics of resistance is now under investigation.

1283 Kuwada, H. & Yamamoto, K.
(On the germination, fertility and some other characteristics of the F_1 of *Abelmoschus esculentus* x *A. manihot*, and the effect of varietal differences in the female parent).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **2** : 106–08. [Japanese].

Crosses were made between 8 strains of *A. esculentus* and 1 of *A. manihot.* A wide range in the percentage germination of the F_1 seeds was noted, some strains of *A. esculentus* giving rise to offspring which germinated more readily than others. A general correlation was noted between percentage germination of the F_1 seeds and such characters as number of seeds per pod, stem length, number of nodes and number of pods per plant in the F_1 plants.

1284 Kuwada, H.
(On differences in physiological and ecological characters between amphidiploids obtained by breeding and the parent plants. IV. On the germination of seeds stored under different conditions).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 127–30. [Japanese].

The amphidiploid of *Abelmosochus esculentus* x *A. manihot* germinates less well than the parent species when stored under especially dry conditions, but this difference disappears if the testas are scarified. The amphidiploid had higher water and peroxidase contents than the parent species.

1285 Kuwada, H.
(On differences in physiological and ecological characters between amphidiploids obtained by breeding and the parent species. V. On assimilation, respiration and translocation in the leaves).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 131–35. [Japanese].

The amphidiploid between *Abelmoschus esculentus* and *A. manihot* photosynthesizes more rapidly than the parent species, but does not differ significantly from them in respiratory rate or speed of translocation.

SUGAR AND STARCH PLANTS

1286 Yang, T.-C. & Chu, T.-L.
(Studies on the technique of field trials of sugar cane. II. Block lay-out).
Taiwan Tangyeh Shihiyenso Yenchiu Huipao/Rep. Taiwan Sug. Exp. Sta. 1952 : No. 8 : 1–14. [Chinese].

As a result of uniformity trials with the variety F 134, it is concluded that (1) the minimum plot size should be 8 m. long by 3 rows wide; (2) the most efficient plot size is 12 x 6·25 or 12 x 8·75 m.^{2} with 5–6 replications; (3) the maximum number of plots per block should be 12; and (4) blocks should be as square as

possible and should be arranged compactly across the rows.

1287 Loh [Lo], C. S. & Tseng, P. M.
(Studies on sugar-cane nobilization).
Kanche Yenchiu/J. Sugar Cane Res. 1951 : **5** : 35–50. [Chinese].

The authors discuss how far a more adequate knowledge of the genetics of sucrose content and vigour could contribute to a reduction in the number of crosses made and the number of seedlings reared in sugar-cane breeding programmes.

1288 **Fifty-third Annual Report of the Bureau of Sugar Experiment Stations, Queensland, 1953** : Pp. 55.

Biparental crosses made during the 1953 season are listed. Polycrossing was also carried out to test the breeding value of a large number of new canes. Seedling selection and seedling variety trials continued. Seedling H 253 is being propagated for commercial use on poor to medium types of soil. Cytological investigation of important breeding canes was initiated; Q 13 was found to be a noble cane; Q 27 and Q 44 are apparently hybrids. A number of the clones of *Saccharum spontaneum* and *S. robustum* introduced from New Guinea in 1951 were also examined cytologically. A satisfactory modification of the technique used in Hawaii for storing arrows in a solution of sulphur dioxide and phosphoric acid was devised. Methods of keeping male-sterile arrows under conditions of raised temperatures at night were also studied, in an attempt to secure a greater amount of viable pollen.

1289 Halais, P.
Enseignements agricoles d'une mission aux Antilles à l'occasion du VIIIème Congrès international des Techniciens de la canne et du sucre. **(Agricultural lessons from a mission to the Antilles on the occasion of the 8th Internatioal Congress of Cane and Sugar Technologists).**
Rev. agric. Maurice 1953 : **32** : 163–73.

The following points in the record of the author's visit to Jamaica, Barbados, Trinidad and British Guiana are of interest to plant breeders. Stevenson's Barbados canes, bred at the Central Station for Sugar Cane Breeding, Barbados (cf. *PBA*, Vol. XXII, Absts. 1291 and 2094), have proved their superiority in Puerto Rico, the French Antilles, in Madagascar and in Mauritius.

Hybridization of noble and wild canes is still the most promising technique in breeding desirable new canes adapted to Mauritius. Varieties recommended as worth introducing into the island are: B 34/62 (Barbados), Pepe Cuca (Cuba), RP 1000 (Puerto Rico), Azul (Peru) and Q 75 (Queensland).

With reference to the need for canes resistant to virus diseases, including stunting, the resistance is mentioned of canes bred in Mauritius, when tested in comparative trials of a world collection of canes in Queensland.

1290 Moriya, A.
Contributions to the cytology of the genus *Saccharum*. V. Chromosome numbers of the hybrid sugarcanes bred in Formosa.
Cytologia, Tokyo 1953 : **18** : 86–92.

The following chromosome numbers are reported and discussed: F 46 [POJ 920 (n = 62) x Fm 3 (n = ?62)], $2n$ = 122; F 107 [POJ 2878 ($2n$ = 118–119) x POJ 2940 ($2n$ = 97)], $2n$ = 107 or 107 + 1 fragment; F 108 [POJ 2725 ($2n$ = 107) x F 46 ($2n$ = 122)], $2n$ = *ca.* 109; F 110 (POJ 2878 x Fm 3), $2n$ = 124; F 118 [POJ 2878 x F 84 (n = ?58)], $2n$ = 117; F 122 [Badila ($2n$ = 80) x EK 28 ($2n$ = 80)], $2n$ = *ca.* 130; F 125 [11/9C ($2n$ = 118) x POJ 2878], $2n$ = *ca.* 128 + 2 fragments; F 133 [POJ 2725 x *S. robustum* ($2n$ = 80), $2n$ = 94; 11/9C [POJ 2725 x sweet sorghum (n = 10)], $2n$ = 118; 271/11C from [POJ 2725 x Japanese broomcorn (n = 10)] x F 108, $2n$ = 112, or 111 + 1 fragment; and 1614/13A (x *S. robustum*), $2n$ = 94. The unexpectedly high chromosome number of F 122 is attributed to the abnormal gamete formation of EK 28, a cane which has received from its parent Loethers chromosomes other than those of *S. officinarum*.

1291 Lo, C.-S., Hu, T.-H., Tang, C.-K., Tseng, P.-M. & Ma, P.-T.
(*Saccharum officinarum S. Narenga* hybrids).
Taiwan Tangyeh Chikan/Taiwan Sug. J. Quart. 1952 : **3** : No. 4 : 108–22. [Chinese].

An English version of this paper is summarized in Abst. 1292.

1292 Loh [Lo], C. S., Hu, T. H., Tang, C. K., Tseng, P. M. & Ma, P. T.
Hybrids of *Saccharum officinarum* x *S. narenga*.
Kanche Yenchiu/J. Sugar Cane Res. 1951 : **5** : 301–22.

Hybrids were reared from the cross *S. officinarum* 'POJ 2725' x *S. narenga*. Cytological studies showed that these were of three types: haploid-haploid and the two possible haploid-diploid

combinations. Numerous multivalents were noted, suggesting chromosome homologies between the parent species. F_2 hybrids were reared by back-crossing to *S. officinarum*; most of these were notable for their rapid growth in the first 2–3 months and for early tillering.

1293 Cheng, C. F.
(The morphogenetic expression of an OMM type derived from the cross POJ 2725 x *Miscanthus*).
Taiwan Tangyeh Shihyenso Yenchiu Huipao/Rep. Taiwan Sug. Exp. Sta. 1952 : No. 9 : 1–16. [Chinese].

From the cross POJ 2725 (genome formula OO) x *Miscanthus* (MM), a hybrid of genomic constitution OMM with 96 chromosomes was obtained. A detailed comparison is made of the morphology of OO, OOM, OM, OMM and MM plants, and the role of the O and M genomes in determining the various morphological characteristics is elucidated.

1294 Loh [Lo], C. S., Hu, T. H., Ma, P. T. & Tseng, P. M.
(Hybrids between sugar cane and bamboo).
Kanche Yenchiu/J. Sugar Cane Res. 1951 : **5** : 1–33. [Chinese].

A detailed description is given of the morphology, physiology and cytology of hybrids obtained from *Saccharum* 'POJ 2725' x *Sinocalamus latiflorus*. The hybrids had a high sugar content and continued growing for 2–3 months after the end of the rainy season. Meiosis in the sugar-cane parent is irregular and both haploid and diploid gametes may be formed. In *S. latiflorus*, $2n = 70$; meiosis is irregular and up to 30 univalents were observed, as well as evidence of secondary association. The chromosome numbers of the hybrids were $2n = 111$, 112 and *ca.* 125; univalents were frequent. It is suggested that the 111 and 112-chromosome hybrids have a haploid chromosome complement from each parent, plus 24 extra chromosomes from the sugar-cane parent. The hybrid with *ca.* 125 chromosomes is believed to have a haploid chromosome complement from the sugar cane and a diploid complement from the bamboo.

1295 Ma, T. -H.
(A taxonomic and cytological study of plants closely related to sugar cane in Taiwan).
Taiwan Tangyeh Chikan/Taiwan Sug. J. Quart. 1952 : **3** : No. 4 : 71–89. [Chinese].

A taxonomic review is given of the species of *Erianthus, Imperata, Miscanthus* and *Saccharum* occurring in Taiwan. Chromosome numbers were also ascertained. The species of *Miscanthus* vary considerably in morphology but all have $2n = 38$ chromosomes; this situation contrasts with the comparatively uniform morphology of *S. spontaneum* in spite of a considerable range in chromosome number within the species.

1296 Li, H. -W. & Ma, T. -H.
(Cytological studies of sugar cane and closely related plants. VIII. Accessory chromosomes of *Miscanthus japonicus* Anders.).
Taiwan Tangyeh Chikan/Taiwan Sug. J. Quart. 1952 : **3** : No. 4 : 62–70. [Chinese].

Three small accessory chromosomes were detected in a plant of the above species in addition to the normal 19 pairs. At meiosis, the accessory chromosomes associated both with each other and with two of the normal chromosomes, from which they are presumed to have arisen by fragmentation.

1297 **Breeding sugar cane at Baton Rouge.**
Sug. Bull., N. Orleans 1953 : **31** : 408–09, 419.

A short popular account is given of the successful application of short photoperiods to induce flowering at the times required for controlled crossing in sugar cane breeding at Baton Rouge, La.

1298 Mok, B. C. [Mo, P. C.] & Chen, H. C.
(Observations on the flowering of sugar cane at Puli, a mountainous site in Taiwan).
Kanche Yenchiu/J. Sugar Cane Res. 1951 : **5** : 91–101. [Chinese].

Comparative trials of 103 varieties at Puli, at an altitude of 447 m. above sea level, and at Pingtung, at 24 m., revealed that flowering occurred much more profusely at the higher site, and several varieties which never arrowed at Pingtung, flowered at Puli. It is believed that the high altitude, with its associated cool, damp climate, is responsible for the more profuse flowering.

1299 Hu, T. H.
(The relationship between planting time and flowering in the sugar cane).
Kanche Yenchiu/J. Sugar Cane Res. 1951 : **5** : 333–46. [Chinese].

Varietal differences are noted in the relation between planting time and the onset of flowering.

1300 Lee [Li], S., Lin, K. S. & Loo [Lu], Y. S.
(The growth of sugar-cane seedlings and correlations between their characteristics).
Kanche Yenchiu/J. Sugar Cane Res. 1951 : **5** : 59–70. [Chinese].
Significant positive correlations were observed between length of millable cane and number of millable canes, on the one hand, and stool weight, on the other, in the progenies of four crosses. A negative correlation was noted between diameter of the canes and number of millable canes.

1301 Pao, T. P.
(Experiments on planting distance and quantity of fertilizer with spring and autumn planted sugar cane varieties).
Taiwan Tangyeh Shihyenso Yenchiu Huipao/Rep. Taiwan Sug. Exp. Sta. 1952 : No. 9 : 83–145. [Chinese].
Varietal differences in respect of response to the above two factors are described for a series of varieties grown in Taiwan.

1302 Chen, C. Y.
(Studies on the drought resistance of sugar-cane varieties utilizing their differential response to potassium chlorate).
Kanche Yenchiu/J. Sugar Cane Res. 1951 : **5** : 71–78. [Chinese].
It was shown that the drought resistance of Taiwan sugar-cane varieties is positively correlated with their degree of resistance to the toxic action of $KClO_3$. This correlation held both in respect of the reaction of the leaves and of the seedlings. The most resistant varieties were POJ 2725 and a Co. variety.

1303 Birkett, L. S. & Cameron, C.
Field experiments with sugar cane, XXI.
Sug. Bull., Georgetown 1953 : No. 21 : 1–39.
The results of the 1952 series of variety trials held in British Guiana are presented, together with data on the more important canes. The importance of resistance to bacterial leaf scald is stressed, and it is recommended that susceptible varieties be discarded.
The varieties B 37172, B 4373 and B 43253 are rated as resistant to leaf scald, and B 4098, B 40105, B 43413, D 158/41, D 4/43 and D 58/43 as tolerant.

1304 Robertson, J. S.
"Leaf scald" investigation.
Sug. Bull., Georgetown 1953 : No. 21 : 61–62.
Of the existing commercial varieties in British Guiana, B 4098 is the only one resistant to leaf scald. Of breeding canes imported from Barbados, B 37254, B 4454, 28 NG 7, Dacca, Tobongo, Kloet, Pasoeroean and Local were resistant, and B 39250, B 39254, B 39274, B 41242, 32 MQ 579 and Kavangire tolerant of the disease.

1305 Lo, T. T. & Ling [Lin], K. C.
(Leaf scorch of sugar cane).
Kanche Yenchiu/J. Sugar Cane Res. 1950 : **4** : 323–35. [Chinese].
Varietal differences are reported in the susceptibility of sugar cane to *Stagonospora sacchari* in Taiwan. The most resistant varieties were Uba and bamboo cane.

1306 Lin, J. T.
(The relation between sugar-cane varieties and leaf scorch. I. The degree of susceptibility of various sugar-cane varieties).
Taiwan Tangyeh Shihyenso Yenchiu Huipao/Rep. Taiwan Sug. Exp. Sta. 1952 : No. 9 : 185–99. [Chinese].
Several hundred varieties grown in Taiwan were tested for degree of susceptibility to *Stagonospora sacchari*. A considerable range in degree of susceptibility was noted, but the mode of inheritance of resistance appeared to be complex, suggesting that several genes are involved.

1307 Wang, C. -S.
(Studies on *Thrips serratus*).
Taiwan Tangyeh Chikan/Taiwan Sug. J. Quart. 1952 : **3** : No. 4 : 90–107. [Chinese].
In the course of a study of infestation of sugar cane in Taiwan by thrips, differences were noticed in varietal susceptibility. The most resistant forms were Co. 290, Co. X and POJ 2883.

1308 Ratkovich, M.
El gusano perforador de la caña de azúcar (*Diatraea saccharalis*) en Tucumán.
[**The sugar cane borer (*D. saccharalis*) in Tucumán**].
Rev. agron. Noroest. argent. 1953 : **1** : 1–67.
In the course of a general study of the sugar cane borer in Argentina it is mentioned that the varieties Co. 270 and Tuc. 2683 are consistently less attacked than those most commonly

cultivated, which are less fibrous and higher in sugar content.

1309 Kwong [Kuang], K. H., Wu, W. Y., Loo [Lu], B. L., Liu [Liao], S. T. & Fu, C. L.
(Report on comparative varietal trials in 1949-50).
Kanche Yenchiu/J. Sugar Cane Res. 1950 : **4** : 307–21. [Chinese].

Sugar-cane varieties grown in Taiwan are compared in respect of germination, tillering, height, growth rate, yield of canes, and yield and quality of juice.

1310 Lee [Li], T. T. & Su, T. C.
(Report on the 1950-51 comparative trials of sugar-cane varieties. I).
Kanche Yenchiu/J. Sugar Cane Res. 1951 : **5** : 79–90. [Chinese].

Ten varieties were compared in respect of germination, tillering, growth rate, root development, and quality and yield of juice. Descriptions are given of PT 46–144, a cane with a high sugar output; PT 46–156, a form with especially rapid growth in the rainy season; and PT 46–190, a cane with a well-developed root system and stems resistant to wind-breaking.

1311 Chen, N. S. & Kwong [Kuang], K. H.
(Report on the 1950-51 comparative trials of sugar-cane varieties. II).
Kanche Yenchiu/J. Sugar Cane Res. 1951 : **5** : 209–18. [Chinese].

Further to the first report on the above trials (cf. Abst. 1310), the authors give additional details on the six most promising varieties, namely: PT 46–93 (derived from Co. 356 and sorghum), a vigorous cane, especially in the early stages of growth; PT 46–242, of similar ancestry to the preceding variety and similar also in agronomic characters save that it is suitable only for sandy soils; PT 46–256, a cane that grows vigorously in the rainy season; Co. 331 and 421, recommended for impoverished upland soils; and H 32–8560, a variety with fast early growth recommended for the coastal regions.

1312 Lee [Li], T. T. & Su, T. C.
(Report on the 1950-51 comparative trials of sugar-cane varieties. III).
Kanche Yenchiu/J. Sugar Cane Res. 1951 : **5** : 219–26. [Chinese].

Eight varieties are compared in respect of suitability for spring planting. The two most promising canes were PT 46–256, recommended for heavy, poorly drained soils, and H 32–8560, a cane with rapid growth at first, though slackening off at the onset of the rainy season.

1313 **(Report on the results of regional variety trials of sugar cane during the period 1950-51).**
Taiwan Tangyeh Chikan/Taiwan Sug. J. Quart. 1952 : **3** : No. 4 : 38–61. [Chinese].

Extensive data are provided on the agronomic characters, disease resistance and output and quality of the juice of a large series of varieties under test in different regions of Taiwan, special attention being paid to the variety F 134.

1314 **(Abridged report of the result of sugar-cane variety trials during 1951-52).**
Taiwan Tangyeh Shihyenso Yenchiu Huipao/Rep. Taiwan Sug. Exp. Sta. 1952 : No. 9 : 17–52. [Chinese].

Extensive tables are given on the agronomic characters, disease resistance and yield and quality of the juice of varieties under trial in Taiwan. Most of the varieties were seedlings raised in recent years by the Taiwan Sugar Experiment Station. The following seedlings receive special mention: 34–96, a high-yielding and uniformly growing cane; 34–117, a vigorous cane resistant to red rot and pineapple disease though susceptible to mosaic; 34–1428, a vigorous form that continues growth till late in the season; 35–523, an early-maturing seedling; 36–149, an early cane resistant to mosaic, red rot and pineapple disease; 36–330, a heavy yielder though rather low in sugar content; 36–845, an erect cane, resistant to borers and to lodging; 37–3, a variety which germinates well and matures early; 37–435, an early cane which tillers heavily and stands well; and 37–1482 and 37-1483, two late seedlings with thick, heavy stems.

1315 **Annual Report of the Research Department of the Sugar Manufacturers' Association (of Jamaica) Limited 1952** : Pp. 59.

In section E of this report the performance of varieties tested on estates in Jamaica during 1952 is discussed. The outstandingly good performance of B 41227, B 42231 and B 4362 justifies a policy of rapidly replacing the standards by these new varieties. Appendix I, summarizing the results of the cane yield survey, includes data on variety performance and distribution. Appendix II tabulates the

data on variety x fertilizer experiments and on variety trials on the estates.

1316 Feltz, H.
Untersuchungen an diploiden und polyploiden Zuckerrüben. (**Investigations on diploid and polyploid sugar beet**).
Z. Pflanzenz. 1953 : **32** : 275–300.

Diploid sugar beet seedlings and root and shoot tips of somewhat older plants were treated with varying concentrations of colchicine to produce 4*n* plants. It was noted that growth was greatly impeded in the C_0 tetraploids, the 2*n* cells being initially more vigorous and eliminating the 4*n* cells. Meiosis in the pollen mother cells of tetraploid and diploid plants was compared. Whilst 2*n* plants showed regular bivalent formation, the 4*n* individuals displayed marked irregularities, forming predominantly quadrivalents but few bivalents. A number of terminal chiasmata were observed. Aneuploidy was frequent. Despite considerable irregularities in meiosis, tetrad formation was more regular than anticipated.
It is suggested that, in selection for breeding purposes, a cytological investigation of possible meiotic irregularities should be carried out. Examination of pollen grains gives a fairly accurate indication of disturbances at meiosis, the presence of sterile micropollen grains of irregular shape and of large-size pollen grains indicating polyploidy.

1317 Hosokawa, S., Sawai, I. & Shichiji, M.
(**A physiological comparison of the first stage of growth of diploid and tetraploid sugar beet grown in water culture**).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **2** : 75–80. [Japanese].

The material studied was the diploid variety Honiku 48 and a colchicine-induced tetraploid strain derived from it. The diploid strain was superior in germination, growth rate, photosynthetic rate and dry matter content, and had a higher osmotic pressure. The tetraploid contained more reducing sugars.

1318 Drachovská-Šimanová, M.
Výzkum odrůd cukrovky se zřetelem na jejich náchylnost vůči cerkosporiose. (**Testing sugar beet varieties for their susceptibility to *Cercospora***).
Sborn čsl. Acad. Zeměd. 1953 : **26** : 549–60.

The Polish varieties CLR and MLR, resistant to *C. beticola*, have given a good account of themselves in most districts of Czechoslovakia, where severe outbreaks of leaf spot occur.

1319 Hendriks, J. A. H.
Opbrengsten van acht cassave varieteiten. Voorlopige mededeling. (**Yields of eight cassava varieties. Preliminary communication**).
Surinaam. Landb. 1953 : **1** : 84–86.

Small-scale trials in Surinam, using 40 plants of each variety, are described, with a table showing the yields every two months from the fourth to the twelfth month. The two best varieties, Mangi and Valenca, yielded 154 and 159·5 kg. respectively after twelve months' growth.

1320 Bolhuis, G. G.
A survey of some attempts to breed cassava-varieties with a high content of proteins in the roots.
Euphytica, Wageningen 1953 : **2** : 107–12.

Attempts were made to improve the protein content by hybridization, but with little success. Further crosses between Indonesian varieties and varieties from Indochina with high protein content but small yield will be made.

STIMULANTS

1321 Lefèvre, J. & Heslot, H.
Polyploïdie incomplète et variations phénotypiques induites par la colchicine chez les hybrides de *Nicotiana*. (**Incomplete polyploidy and phenotypic variations induced by colchicine in *Nicotiana* hybrids**).
CR Acad. Sci., Paris 1953 : **237** : 576–78.

The allopolyploid *N. tabacum* x *N. sylvestris* (2*n* = 72) and its back crosses to each parent were all treated with colchicine. Numerous leaf and floral aberrations resulted.
In the double allopolyploid *N. tabacum* x *N. sylvestris*, white, yellow, purple and variegated flowers, in addition to the normal pink flowers, arose, several colours often appearing in the same plant. It is thought that plants of this kind are complex chimeras combining distinct genetic tissues. Most of these chimeras were sterile, and the few seeds set did not germinate. The existence of distinct cellular lines was confirmed by the cytological examination of three flower buds of a deformed pink-flowered C_1 plant. In the first bud, $n = 54-55$; in the second, $n = 66–71$; in the third bud a mixture was observed, $n = 66–71$ and $n = 46–48$. The plant thus combined three lines, corresponding to the somatic chromosome numbers

$2n = 114$, $2n = 110$ and $2n = 96$, respectively. From the C_3 generation on, fertile plants tended to revert more and more in their morphology and meiosis to the original allopolyploid ($2n = 72$), until the two types became indistinguishable.

In the treated back cross of the allopolyploid to its *N. tabacum* parent, retarded monovalents occurred during meiosis, with some chromosomes remaining outside the nucleus. Chimeras were observed among the C_1 generation.

Meiosis was also irregular in the cross between the initial allopolyploid and its *N. sylvestris* parent. The C_1 was mainly sterile, and had a chromosome number of $2n = 96$.

1322 Pogliaga, H. H.
Híbrido intergenérico "*Nicotiana* x *Petunia*." II parte. (**Intergeneric hybrid *Nicotiana* x *Petunia*. Part II**).
Rev. argent. Agron. 1953 : **20** : 144–46.

The second of the two hybrids of *N. tabacum* x *P. parodii* previously referred to (cf. *PBA*, Vol. XXIII, Abst. 1365) is now described. In vegetative features it resembles the former hybrid but the flowers show greater resemblance to those of *N. tabacum*; its chromosome number is 35 as against 31 in the former hybrid, suggesting that it arose from an egg cell with an aberrant chromosome number. The hybrid was completely sterile in both selfings and back crosses.

1323 Săndulescu, R.
Hibridarea vegetativă la tutun. (**Vegetative hybridization in tobacco**).
Bul. Tutun. 1953 : **40** : 76–83.

In a comparative study of the seed generation derived from grafts involving the varieties Ialomiţa, Banat, Molovata, Iaka de Drăgăşani, Ghimpaţi and Special 400, only two combinations, Banat/Ghimpaţi and Ialomiţa/Ghimpaţi, proved of interest. The progeny of these two combinations produced a superior yield of foliage.

1324 Anţia, N. & Cirillo, A.
Vitalitatea polenului de tutun. (**The vitality of tobacco pollen**).
Bul. Tutun. 1953 : **40** : 51–75.

Pollen of the varieties Drăgăşani, Molovata and Chimpaţi remains viable up to 57 days after collection if kept in a desiccator, but inferior seeds result from fertilization with pollen more than 30 days old. If the pollen is merely stored in a dry container, it should be used within 10 days after collection.

1325 Bolsunov, I.
Für Österreich wirtschaftlich interessante und aussichtsreiche Tabaksorten. (**Promising tobacco varieties of economic interest to Austria**).
Tabakpfl. Öst. 1952 : **3** : No. 3 : 1–3; 1953 : **4** : No. 1 : 1–4; Nos. 3–4 : 5–11.

Morphological data on the main varieties of tobacco cultivated in Austria are given, and their respective suitability to Austrian conditions is compared.

1326 Clayton, E. E.
A method of identifying disease resistance suited to interspecific transfer.
Phytopathology 1953 : **43** : 468–69. (Abst.).

It is stressed that, for the successful transfer of disease resistance to *Nicotiana tabacum* from another species, the resistance must be suitably inherited, preferably monogenically. Methods of evaluating the genetic nature of resistance to a given disease are briefly discussed, with reference to hybrids of *N. tabacum* with *N. debneyi*, *N. longiflora* and *N. glutinosa*. If an F_1 interspecific hybrid, or allotetraploid of *N. tabacum* and another species, is less resistant than the resistant parent, the resistance in question is probably polygenic and partly recessive; such resistance is difficult to transfer interspecifically.

1327 **Black shank-resistant burley may be released.**
Sth. Seedsman 1953 : **16** : No. 11 : p. 22.

The Tennessee Agricultural Experimental Station has announced its intention of releasing a new burley tobacco variety, resistant to black shank, for planting in 1954.

1328 Racoviţă, A.
Contribuţii la cunoaşterea rezistenţei la atacul ciupercii *Thielaviopsis basicola* (Berk) Ferraris, a varietăţilor de tutunuri cultivate în R.P.R., şi a unor varietăţi străine. [**Contributions to the knowledge of resistance to attack by the fungus *Th. basicola* (Berk.) Ferraris in the varieties of tobacco cultivated in the Rumanian People's Republic and in some foreign varieties**).
Bul. Tutun. 1953 : **40** : 97–110.

Comparative trials of Rumanian and other, chiefly American, varieties artificially inoculated with *Th. basicola* showed that varieties of *Nicotiana rustica* such as Tombac and Mahorcă, and oriental tobaccos such as Iaka-Drăgăşani

and Molovata, were highly resistant. Varieties of the Bright type were very susceptible.

1329 Fulton, R. W.
Resistance in tobacco to cucumber mosaic virus infection.
Phytopathology 1953 : **43** : p. 472. (Abst.).

Forty-four species of *Nicotiana* and over 350 accessions of *N. tabacum* were tested for their reaction to ordinary cucumber mosaic virus; none showed tolerance or hypersensitivity. Most of the 125 accessions of *N. tabacum* tested for number of lesions produced per unit of leaf area inoculated developed the same number as the control, Wisconsin Havana 38. Several, however, developed only about one-tenth as many. Under field conditions the most resistant of the latter showed about 4% infection at harvest, whereas commercial varieties exhibited 20·5%. Apparently resistance to infection by mechanical inoculation is also effective against naturally occurring strains of mosaic, presumably transmitted by aphids.

1330 Holmes, F. O.
The tendency of some types of tobacco to escape infection by tobacco-mosaic virus.
Phytopathology 1953 : **43** : 475–76. (Abst.).

The mosaic resistance of the hybrid Java Isère x Cabot, previously reported by Schwartz and Cuzin (cf. *PBA*, Vol. XXII, Abst. 1326), has been confirmed. The tendency of this and other types to escape infection is due to two independent genes, *N* for hypersensitivity and a recessive gene for tolerance; the latter is presumed to be the factor r_{m1} postulated by Nolla (cf. *PBA*, Vol. VIII, Abst. 914). Plants possessing the two genes, which are additive in effect, show only a few, small necrotic primary lesions after inoculation.

1331 **Delcrest and Hicks lead variety trials.**
Inter. Rep. Tob. Res. Bd. S. Rhod. 1953 : No. 2 : unpaginated.

In trials held at the Kutsaga and Trelawney Research Stations, Southern Rhodesia, during 1951–52, Delcrest and Hicks proved superior in yield and quality to all other tobacco varieties tested.

1332 Rimando, V. C.
A comparison of some aromatic tobacco varieties.
Philipp. Agric. 1952 : **36** : 27–46.

The results of trials of 13 Virginia and Turkish varieties in the Philippines are reported.

1333 French, F. L.
Tobacco experiments. Varietal tests at Nathalia.
J. Dep. Agric. Vict. 1953 : **51** : 420–24.

Trials of six flue-cured varieties from the United States and Canada and of the standard Hickory Pryor were carried out for three seasons at Nathalia, Victoria. On the basis of gross monetary return per acre, Yellow Special, Virginia Gold and Delcrest showed most promise. Virginia Gold is recommended for the main planting in the Murray valley.

1334 Carvalho, A., Krug, C. A., Mendes, J. E. T., Antunes Filho, H., Morais, H. de, Aloisi Sobrinho, J., Morais, M. V. de & Rocha, T. R. da.
Melhoramento do cafeeiro. IV. Café Mundo Novo. (**Improvement of coffee. IV. Mundo Novo coffee**).
Bragantia 1952 : **12** : 97–129.

The Mundo Novo [New World] coffee was developed by selecting a number of superior trees from some exceptionally fine plantations growing in the Mundo Novo district of Brazil and thought to be derived from the original Sumatra coffee introduced in 1896. The selections are characterized by high vegetative vigour; some of the trees show resemblances to var. *bourbon* and others to var. *typica* of *Coffea arabica*. When crossed with plants of var. *murta* heterozygous for the gene *Na*, however, they gave equal numbers of *murta* and *bourbon* types, showing the absence of the gene *T* for var. *typica*. The Mundo Novo coffee is therefore thought to have originated from natural crosses between the Sumatra coffee and the local Bourbon. The best progenies are under observation at several places. They display variation in certain characters such as growth habit, branching, total yield, and number of empty locules. Some progenies were almost free from this defect, which appeared to be hereditary; it is not directly correlated with seed yield but progenies free from it have been selected. The best of them outyield the ordinary Bourbon, are later in maturity and vary less in yield from year to year.

1335 Carvalho, A.
Melhoramento do cafeeiro. VI. Estudo e interpretação, para fins de seleção, de produções individuais na variedade *bourbon*. (**Improvement of coffee. VI. Study and interpretation, for the purposes of breeding, of individual yields in the variety *bourbon***).
Bragantia 1952 : **12** : 179–200.

Data are given on mean yield per plant of a

seedling plot of *Coffea arabica* var. *bourbon* for which information was available for 19 years, from 1933 to 1951. A preliminary selection was made in 1933, based on vegetative characteristics without a knowledge of the yields; another was made in 1935 on the basis of vegetative characters and 3 years' yield data, and later selections were made after 6, 8, 9 and 13 years of yield data had been examined. Of the plants selected after 13 years, 91·3% belonged to the best 100 plants after 19 years, whereas the earlier selections had progressively lower proportions in this top group, namely 50% for the selections made at 9 years, 25% for those at 8, 10% for those at 6 and 8·3% for those based on vegetative characters alone. Eight of the trees selected at 13 years were among the best 10 at 19 years. Figures are also given showing how many of the best trees selected in the different years were included in the best 100 and the best 25 at 19 years; again there is a progressive increase and the selections after 14 years contained 71 of the best 100 and 23 of the best 25 trees at 19 years. The yields for a single year or for two consecutive years gave slightly less reliable indications of the final productive capacity, especially those for the earlier years of growth; nevertheless if the best 100 trees for the 14th year had been selected, 23 out of the best 25 would have been included. Taking the figures in general, 64% of the plants revealed their superiority by the 14th year of yield records.

Observations were also made on the progenies of the selections made in the different years. In those from the first selection, made on vegetative features alone, it was found that selection based on the yields of the 10 best seedlings at the end of 10 years would have included 90% of the best seedlings at 15 years; selection at the end of 7 years would have included 87%. The progenies of the second series of selections, based on 3 years yield tests, showed little change in relative behaviour after the fourth year and selections made in that year contained 75% of the 12 best trees at 13 years, and selections made in the 6th year 78%. The best tree in the first series of selections gave rise to the best progeny and the 2nd and 3rd trees gave progenies which took 3rd and 2nd place respectively. In the second series of selections the correspondence between yields of mother trees and progenies was less close, in the third series plants Nos. 1 and 2 gave progenies 1 and 2 respectively; the best plant of the 4th series of selections also gave the best progeny.

When the yields of the mother plants were compared with those of their first and second selfed generations a fairly close correlation was also noticed, the best mother tree again giving the best progenies.

1336 Krug, C. A. & Carvalho, A.
Melhoramento do cafeeiro. V. Melhoramento por hibridação. (**Improvement of coffee. V. Improvement by hybridization**).
Bragantia 1952 : **12** : 141–52.

An outline is given of the work carried out at the Campinas experimental station in Brazil on the taxonomy and cytology of *Coffea* species and on hybridization within and between species. Heterosis has been observed in some of the hybrids between two different botanical varieties of *C. arabica*, e.g. vars. *bourbon* and *maragogipe*. The gene *t* in var. *bourbon* gives rise to higher yields than the dominant *T* of var. *typica* and efforts have been made to introduce *t* into other varieties; the genes *lr* and *mo* in var. *mokka* both lead to superior flavour, and var. *caturra* has unusual capacities of fruit production and yield.

From hybrids of *C. arabica* x *C. canephora* a form with 66 chromosomes has been obtained by colchicine treatment; it segregates in its progeny. Other species that have been crossed with *C. arabica* are *C. dewevrei*, *C. congensis*, *C. liberica* and line 387, thought to be itself a hybrid of *C. dewevrei* x *C. arabica*.

1337 Mendes, A. J. T.
A hibridação interespecifica no melhoramento do cafeeiro. (**Interspecific hybridization in coffee improvement**).
Bragantia 1951 : **11** : 297–306.

Tables are given which show that from 1761 flowers of four triploid hybrids of *Coffea arabica* x *C. canephora* subjected to self pollination, only 2 seeds were obtained. Back crosses with *C. canephora* gave no seed, those with *C. arabica* produced 4 viable seeds from 374 flowers pollinated. One normal, viable seed was also obtained by pollinating *C. arabica* with the hybrid. Open pollination of the hybrids led to the production of a number of seeds, mostly, probably, from pollen from *C. arabica* trees. The back-cross hybrids displayed considerable variation in morphological features and in chromosome number; one of the hybrids showed a tendency to produce plants with $2n = 55$, another, plants with $2n = 44$. One of the 44-chromosome back-cross hybrids gave a 58·6% set of fruit and another 46·8%. Both are

considered of interest from the point of view of combining the resistance of *C. canephora* to *Hemileia vastatrix* with the good qualities of *C. arabica.*

1338 CARVALHO, A.
Genética de *Coffea.* XIV. Hereditariedade do cálice petalóide em *Coffea arabica* L. var. *calycanthema* K.M.C. **(Genetics of *Coffea.* XIV. Inheritance of petaloid calyx in *C. arabica* L. var. *calycanthema* K.M.C.).**
Bragantia 1952 : **12** : 131–40.

The coffee with well-developed, petaloid calyx, found as a single tree of *C. arabica* var. *typica* in 1935, is described. It has 44 somatic chromosomes and normal pollen but displays a high degree of female sterility, owing to abnormal development of the style and stigma. Crosses effected by using the petaloid form as pollen parent segregated into almost equal numbers of normal and *calycanthema* plants, showing the character to be dependent on a single dominant gene, though there was often a slight deficiency of *calycanthema* individuals; the normal segregates bred true for normal flowers, the *calycanthema* segregates behaved like the original parent.
No results were obtained in attempts to transfer the character to other species by pollinating them with the original form; one of the segregates however gave two *calycanthema* hybrids of *C. dewevrei* when used to pollinate that species. When crossed with var. *murta* the *calycanthema* type gave no *murta* plants and is considered to be a mutant of var. *typica.*

1339 CARVALHO, A. & KRUG, C. A.
Genética de *Coffea.* XV. Hereditariedade dos característicos principais de *Coffea arabica* L. var. *semperflorens* K.M.C. **(Genetics of *Coffea.* XV. Inheritance of the main characteristics of *C. arabica* L. var. *semperflorens* K.M.C.).**
Bragantia 1952 : **12** : 163–70.

The form referred to flowers almost continuously throughout the year and was found as a mutant of var. *bourbon.* The character was transmitted to all the progeny on selfing and on crossing different plants of var. *semperflorens,* and in crosses with other varieties it proved to be controlled by a single recessive gene, designated *sf.* In crosses with vars. *murta* and *nana* the variety proved to be recessive for gene *T,* as would be expected in a mutant of var. *bourbon.* It is identical with var. *bourbon* in quality but has the advantage of being somewhat more productive and more resistant to drought.

1340 CARVALHO, A.
Taxonomia de *Coffea arabica* L. V. Algumas recombinações genéticas. **(Taxonomy of *C. arabica* L. V. Some genetic recombinations).**
Bragantia 1952 : **12** : 171–78.

The haploid form with 22 chromosomes has been encountered in a number of botanical varieties of *C. arabica* and the designation var. *monosperma* is not therefore valid for it. Similarly, the *bullata* type, with $2n = 66$ or 88, has been found in almost all varieties, and is not a valid variety. The yellow-seeded form has been found in several varieties, but nevertheless been accepted as var. *xanthocarpa.* The gene *Na,* in the absence of *T,* conditions var. *nana* when heterozygous and var. *bourbon* when homozygous. Tables are given of a number of other gene combinations having characteristic manifestations which might have been assigned varietal status had their genetic constitution not been known. Some of them are of economic interest, as for instance the combination *maragogipe-semperflorens,* which is drought resistant, and some of the *xanthocarpa* combinations, which are superior in yielding capacity.

1341 CARVALHO, A.
Taxonomia de *Coffea arabica* L. VI. Caracteres morfológicos dos haplóides. **(Taxonomy of *C. arabica* L. VI. Morphological characters of haploids).**
Bragantia 1952 : **12** : 201–12.

Haploid plants with $2n = 22$ have been encountered in a number of botanical varieties of *C. arabica* and all correspond roughly to the type originally described as var. *monosperma.* All are self sterile but under conditions of uncontrolled pollination they occasionally form a few fruits which give rise to plants with $2n = 44$. Somatic mutations with $2n = 44$ and restored fertility have been produced in some of the haploids of var. *bourbon* both naturally and artificially. They give exceptionally uniform progeny.
The genes determining the characteristics of vars. *typica, bourbon, maragogipe, semperflorens, laurina, erecta, caturra* and *san-ramon* achieved their full expression in the respective haploids, regardless as to whether they were dominant or recessive.
The characteristics of the haploids indicate that if *C. arabica* is an allopolyploid species it must

have arisen a long time ago, since its behaviour is now that of a typical diploid.

1342 Medina, D. M.
Observações citológicas em *Coffea*. XIX. Microsporogênese em *Coffea dewevrei*. (**Cytological observations in *Coffea*. XIX. Microsporogenesis in *C. dewevrei***).
Bragantia 1952 : **12** : 153–62.
The species is diploid with $2n = 22$ and is self sterile. The first and second metaphase divisions proved to be normal, leading to normal tetrad and pollen formation. Data for the number of chiasmata in metaphase I show that an average of 7·3 bivalents had 1 chiasma, 2·7 had 2 and 1·0 had 3 chiasmata.

1343 Antunes Filho, H.
Sementes "moca" et "concha" no café Mundo Novo. (***Moca* and *concha* seeds in Mundo Novo coffee**).
Bol. Suptda Serv. Café, S. Paulo 1953 : **28** : No. 317 : 8–16.
Moca seeds are formed in coffee when only one ovule develops instead of the normal two, *concha* is the designation of seeds contained in a locule in which more than one seed develops. Data are provided on the frequency of *moca* and *concha* seeds in the progenies of samples of Mundo Novo [New World] coffee under investigation at the Campinas Research Station, São Paulo, Brazil. No clear evidence of hereditary differences in the frequencies of these anomalies was obtained.

1344 Silva, H. L. da
O café de Moçambique. (**Moçambique coffee**).
Gaz. Agric. Moçamb. 1953 : **5** : 258–60.
The wild coffee of Moçambique is adapted to conditions of very low water supply and compares favourably with the best Moka as regards quality. Several species have been identified, the main one being *Coffea racemosa*.

1345 **Report of the Cocoa Conference held at Grosvenor House, London, W.1, 15th to 17th September, 1953** : Pp. 148.
An interim report on the Anglo-Colombian Cocoa Collecting Expedition is given (cf. Abst. 546).
An appendix deals with the mechanism of self sterility in *Theobroma cacao*. This report has been summarized already in Abst. 543.
Data on the cacao breeding programmes in West Africa and the Belgian Congo are presented. The comparative yields, in West Africa, of (1) the West African Amelonado; (2) the Gold Coast hybrid type, which has developed from natural crossing between the West African Amelonado and varieties introduced from Trinidad; and (3) introductions from South America, are tabulated. Of the latter group, the Amazonian varieties are especially promising. They grow vigorously, come into bearing early, and are high yielding. Their flavour tends, however, to be inferior to that of West African cacao.
Preliminary pollination studies in West Africa indicate that cross-pollination takes place over a greater distance than hitherto believed. An isolation distance of 50 yds. still permits a fair degree of cross pollination.

1346 Urquhart, D. H.
Cocoa growing in Western Samoa.
Tech. Pap. S. Pacif. Comm. 1953 : No. 39 : Pp. 18. (Mimeographed).
This report on the present status and possible extension of the cocoa industry in Western Samoa includes recommendations on the type of cacao considered to be most suitable for cultivation and on the short-term measure of vegetative multiplication of selected material and the long-term measure of breeding suitable seed. Mention is made of a tree named Lafi 7 showing outstandingly good resistance to *Phytophthora* and now being studied by the New Zealand Reparation Estates.

1347 Addison, G. O'N. & Tavares, R. M.
Observações sôbre as espécies do gênero *Theobroma* que ocorrem na Amazônia. (**Observations on the species of the genus *Theobroma* that occur in Amazonia**).
Bol. tec. Inst. agron. Norte 1951 : No. 25 : Pp. 20.
The main distinguishing features of the nine Amazonian species of *Theobroma* are defined and the species are illustrated. Seeds have been obtained in crosses of *Th. cacao* with *Th. speciosum*, *Th. mariae*, *Th. microcarpum* and *Th. obovatum* but most of them failed to germinate. *Th. cacao* x *Th. bicolor* gave no seeds at all. A number of dwarf plants resembling *Th. cacao* and thought to be probably haploids were produced in several of the crosses.
Descriptions are given of the hybrids *Th. grandiflorum* x *Th. obovatum*, which were fertile and intermediate between the parents in most characters; *Th. grandiflorum* x *Th. subincanum* and the reciprocal; and *Th. subincanum* x *Th. obovatum*, which was sterile and sometimes displayed considerable growth anomalies. It is concluded that these three species constitute a

related group, the affinity of *Th. subincanum* with *Th. grandiflorum* being greater than that of *Th. obovatum.* Other hybrids described are *Th. spruceanum* x *Th. speciosum* and the reciprocal; *Th. bicolor* failed to cross with either of these two species, although grafting results show a certain degree of affinity with them. A certain affinity was observed also between *Th. grandiflorum* and *Th. cacao*, and a few hybrids were obtained between them.
The affinities of the various species as revealed by grafting experiments were roughly the same as those indicated by crossing.

1348 **Cacao research program of the inter-American cacao center.**
Cacao Inform. Bull. 1953 : **2** : 1–4.

Notes are given on the chief lines of investigation in progress at the Inter-American Cacao Centre, Turrialba, Costa Rica. Physiological and ecological studies, selection, the development of a suitable technique of testing for resistance to pod rot (*Phytophthora palmivora*), collection and cataloguing of clones are among the projects.

1349 Urquhart, D. H.
Cocoa growing in Netherlands New Guinea.
Tech. Pap. S. Pacif. Comm. 1953 : No. 37 : Pp. 9. (Mimeographed).

The possibility of extending cacao cultivation in Netherlands New Guinea beyond the small amount now grown in the territory is examined from various aspects, including the selection of Amelonado, the best local hybrids and of introductions from Keravat, New Britain, in order to obtain suitable planting material.

1350 Rosenquist, E. A. & Sockalingam, T.
Amelonado cacao in Malaya.
Malay. agric. J. 1953 : **36** : 164–80.

The Amelonado type was introduced from the Gold Coast into Malaya in 1949. An account is given of trials of Amelonado in comparison with open-pollinated and legitimate seedlings of local Trinitario. The results of these trials have led to the recommendation of Amelonado for commercial planting.

1351 Heikinheimo, A.
Öljykasvikokeet Tammistossa. (**Experiments with oil plants at Tammisto**).
Siemenjulk. Hankkija KasvinjalosLaitos Tammisto 1946 : 221–31.

Comparisons have been made between several oil plants, and the yield data given include figures for the poppy varieties Mahndorf and Müncheberg, which are compared with the standard variety Peragis.

1352 Howard, G. A. & Tatchell, A. R.
Further observations on the occurrence and isolation of cohumulone.
J. Inst. Brew. 1953 : **59** : 491–98.

An analysis of 18 hop varieties indicated that in the majority of cases cohumulone formed 5–10% of the α-soft resin. The α-soft resin of Brewer's Gold and Bullion, however, probably contained 30–40%.

1353 Nash, A. S.
Hop growing in Victoria.
J. Dep. Agric. Vict. 1953 : **51** : 439–42, 448.

Data on five new Australian hop varieties are presented. Ringwood Special, a hybrid produced from Fuggle, is a midseason variety with vigorous growth, and gives a heavy crop of good quality hops. A sister seedling of Ringwood Special, 56/1/6, produces large hops on long laterals and is easy to pick. It obtained a high rating in beer-tasting tests. An early variety, 51/1/35, obtained by crossing White Vine with a vigorous male, is easy to pick and of good quality. A cross between Californian Golden Cluster and an English male gave 36/0/21. It is a heavy yielder of semiseedless hops which are easy to pick, and obtained a high rating in the tasting tests. A cross between Tasmanian Late and a Cluster male, 53/1/153, is a late maturing variety, with large attractive hops on long laterals.

1354 Hunt, O. J.
Determination of sample size for evaluating resistance to downy mildew in hops.
Agron. J. 1953 : **45** : 406–08.

Investigations were carried out on 21 hop varieties at the Oregon Agricultural Experiment Station to determine the effect of the size and distribution of samples upon the efficiency of the procedure of evaluating reaction to artificial inoculation of downy mildew (*Pseudoperonospora humuli*) in breeding. The relative efficiency of the sampling method increased as the number of plants was increased. Raising the number of suckers at the expense of the number of leaves also increased the relative efficiency. The latter result is of particular interest to the breeder, since normally first year seedlings branch freely, although clonal propagation is not possible until after the second year.

MINOR CROP PLANTS

1355 MARINET, J.
La culture du poivre dans l'Inde. Rapport de mission (14 janvier au 7 février 1953). [**Pepper cultivation in India. Report of the mission (14 January to 7 February 1953)**].
Agron. trop., Nogent 1953 : **8** : 482–505.
This report includes (1) descriptions of 12 cultivated varieties from Travancore and 5 from Madras; (2) the names of 9 varieties imported from Madras into Travancore; and (3) brief observations on the biology of flowering and fruiting of the pepper plant.

1356 HEISER, C. B. (JUN.) & SMITH, P. G.
The cultivated *Capsicum* peppers.
Econ. Bot. 1953 : **7** : 214–27.
An account is given of the cultivated *Capsicum* peppers with reference to their history, uses, capsaicin content, taxonomy, evolutionary relationships, cytology and genetics. It is concluded that the cultivated species probably had at least one or more centres of origin in South America, and possibly an independent centre of origin in Mexico. Much work requires to be carried out on the genus: (1) taxonomical and cytogenetical investigations of the genus as a whole, particularly the natural distribution of the wild species, (2) thorough study of the varieties grown by primitive peoples in Central and South America, and (3) scrutiny of the early literature, including the herbals.

1357 HARE, W. W.
Nematode resistance in pepper.
Phytopathology 1953 : **43** : p. 474. (Abst.).
Information is given on the reactions of six varieties of *Capsicum* to five species of *Meloidogyne*.

1358 GREENLEAF, W. H.
Effects of tobacco-etch virus on peppers (*Capsicum* sp.).
Phytopathology 1953 : **43** : 564–70.
A severe strain of tobacco-etch virus was shown to be the cause of a wilt disease in Tabasco pepper. The pepper varieties P.I. 152225 and South Carolina 46252 were resistant to the wilt and should prove useful in breeding resistant varieties.

1359 JENKINS, B. C.
Oil seed crops. New developments and possibilities.
Agric. Inst. Rev. 1953 : **8** : No. 5 : 31–32, 67.
Developments in the use and cultivation of linseed, safflower, sunflower and rape in Canada are discussed, mainly from the standpoint of possible achievements in breeding.

1360 ANDERSSON, G.
Svalöfs Regina vårraps II. (**Svalöf Regina II spring rape**).
Sverig. Utsädesfören. Tidskr. 1953 : **63** : 201–04.
Among the aims in spring rape breeding in Sweden are: more vigorous and uniform growth and flowering; increased seed production and oil content of the seed; stronger stems; and earlier ripening. Hybridization of spring and autumn rapes has yielded some highly promising material, which must, however, be back crossed to increase its earliness.
X irradiation in 1941 of Svalöf Regina followed in 1942 by pedigree selection culminated in the production of line Sv. 44/247 which will be put on the Swedish market as Sv. Regina vårraps II. That the mother plant of this new rape was derived from a mutant is not improbable, though not actually proved.
The new variety, which is morphologically indistinguishable from Sv. Regina B and shows no clear differences in regard to oil content, earliness, strength of stems, shedding and resistance to pests, has surpassed Sv. Regina B in seed yield by 4% in numerous trials and is more uniform in ripening and in plant height.

1361 ANDERSSON, G.
Vårraps och vårrybs. (**Spring rape and spring turnip rape**).
Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1952 : 22–24.
Swedish trials to date show that the yield of the only spring rape at present in cultivation in Sweden, Sv. Regina élite B, has been exceeded by 6% by a new élite, Regina D, which is being multiplied.
In spring rape breeding crosses between spring and autumn varieties have been made to combine yield with high oil content, and efforts are also being directed towards obtaining a more uniform and rapid habit of growth.
The highest yielding spring turnip rape Sv. Gute (cf. *PBA*, Vol. XXII, Abst. 2922) exceeded the German variety Mettes by 10%.
Another spring turnip rape, Fenno, though more vigorous, ripens later than Gute and has not yet proved its equal in seed production.

1362 KANASAWA, K. & KAGAWA, A.
On the differentiation of the flower buds in varieties of *Brassica juncea*.
Kyushu Daigaku Nogakubu Gakugei Zasshi/Sci. Bull. Fac. Agric. Kyushu Univ. 1951 : **13** : 100–05. [Japanese].
Some 30 varieties of *B. juncea* and a few of *B. cernua* were compared for the time taken from

sowing to the differentiation of the flower buds. The varieties of *B. juncea* could be classified into early, intermediate and late groups; *B. cernua* came into the late category.

1363 KATAYAMA, T.
(Failure of chromosome pairing in an asynaptic plant of the castor-oil plant).
Kyushu Daigaku Nogakubu Gakugei Zasshi/Sci. Bull. Fac. Agric. Kyushu Univ. 1953 : **14** : 1–6. [Japanese].
A morphological and cytological description is given of an asynaptic plant observed in line 81. Fertility was reduced to 4·54%.

1364 NARAIN, A.
Artificial production of tetraploids in *Ricinus communis* Linn.
Curr. Sci. 1953 : **22** : 268–69.
In experiments at the Government Agricultural College, Kanpur, India, treatment of shoots or germinating seeds with 0·3% colchicine solution was the most satisfactory method of inducing tetraploids ($2n = 40$).

1365 SINGH, D.
Sesame, its genetics, breeding and culture.
Tech. Bull. Dep. Agric. Uttar Pradesh 1952 : No. 7 : Pp. 41.
With reference to the literature, a survey is given of the history and origin of sesame, its distribution and production, genetics, flowering habits, natural cross pollination, the technique of controlled pollination, interspecific hybridization, cytology, colchicine induction of polyploids, and breeding in India and other countries. In Uttar Pradesh, hybridization between promising strains has recently been initiated at Kanpur, and the opening of a new substation at Belatal will provide facilities for breeding varieties for the Bundelkhand area, the chief sesame growing region of the state. A table provides information on the improved strains so far developed in India.

1366 MARTIN, J. A.
Sesame .... Research moves ahead.
What's New Crops Soils 1953 : **6** : No. 2 : 10–11.
Breeding progress with sesame is described. A non-shattering variety has been developed. Other aims are increased resistance to *Cercospora*, *Alternaria*, *Fusarium* and aphids.

1367 BRUCE, E. A.
Notes on African Pedaliaceae.
Kew Bull. 1953 : No. 3 : 417–29.
A note is included giving a historical survey of classifications of the genus *Sesamum*, suggesting that the sections previously used serve no useful purpose and that *S. schenkii*, *S. gibbosum* and *S. grandiflorum* are synonymous.

1368 ARMSTRONG, J. K. & ARMSTRONG, G. M.
***Fusarium* wilt of sesame.**
Plant Dis. Reptr. 1953 : **37** : 77–78. (Mimeographed).
Information is included on the reaction of nine varieties and breeding lines of sesame to an isolate of *Fusarium* occurring in south Georgia. Only Sirogona was highly resistant.

1369 FRÖIER, K.
Oljelin. **(Linseed).**
Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1952 : 24–25.
The yield, oil content and quality of the Svalöf varieties Valuta (cf. *PBA*, Vol. XXI, Abst. 139) and Renodlat oljelin II [Pure-bred linseed II], put on the Swedish market in 1949 and 1952 respectively, are described.
In all the Swedish Seed Association's trials since 1943, Valuta has surpassed Renodlat oljelin in seed production by 5·6%. The latter could now be replaced by Renodlat oljelin II, in view of the uniformity and superior agronomic value of the new selection.

1370 **Hardier new flax bred for south Texas growers.**
Sth. Seedsman 1953 : **16** : No. 11 : p. 52.
Newturk, a new variety of linseed descended from the original Turkey variety, is described. It is more winter hardy, slightly taller, and appears to have a higher and better quality oil content than its parent variety.

1371 FRIEDERICH, J. C.
Resultaten van het rassenonderzoek bij olievlas en van het onderzoek van de factoren, die zaadopbrengst en vetgehalte kunnen beinvloeden. **(Results of linseed variety trials and of an investigation of the factors that may affect seed yield and oil content).**
Versl. Inst. landb. Onderz., Wageningen 1952 : 149–54.
Though the 1952 trials of 15 varieties of flax from Denmark, the Netherlands, Morocco and other countries were markedly affected by the weather conditions in 1952, the following points are of interest. Valuta proved susceptible to lodging and browning caused by *Alternaria* infection. The seed coat of the linseed cultivated in the Netherlands proved to be tougher than in imported linseed.

1372 GAUTHERET, R. J.
Recherches sur la culture des tissus d'hybrides de soleil et de topinambour. **(Researches on the tissue culture of hybrids between the sunflower and artichoke).**
CR Soc. Biol., Paris 1952 : **146** : 861–63.

Tissue cultures of the artichoke can be maintained indefinitely if supplied with mineral salts, glucose and indoleacetic acid. Cultures of the sunflower require in addition a series of growth factors. Interspecific hybrids between these two species grow satisfactorily on the same media as the artichoke; in addition, they form buds in culture, which neither of the parents do.

1373 DEVUYST, A.
Selection of the oil palm (*Elaeis guineensis*) in Africa.
Nature, Lond. 1953 : **172** : 685–86.

At the Research Department, Huilever SA, Yaligumba, Belgian Congo, data have been obtained leading to the conclusion that a positive correlation exists between the quantity of leaves (number of leaves x the leaf area) produced during a particular period before fruiting begins and the weight of bunches produced in later years. It has also been found that the potential frond production of a group of palms before the onset of fruiting is positively correlated with the average earliness of the group. An easy method of selection suitable for applying to a large number of plants in the nursery, and based upon the former conclusion, was sought. A positive correlation was detected at the age of twelve months between quantity of fronds and plant height, the latter being in practice the length of the most fully developed leaf. Thus under uniform conditions, selection for bunch weight can be based upon plant height at the age of one year. This criterion may be used not only in the nursery, but also in experimental selection and breeding.

1374 **Report for 1952-1953 (Sixth year) of the Wattle Research Institute.**
1953 : Pp. 55.

Review of work in progress. (b) Genetics and plant breeding. (pp. 21–26).

In most families of green wattle (*Acacia decurrens*) a second generation of inbreeding produced a further decrease in height, compared with the open-pollinated progenies of the original parents.
Hybrids have been obtained from crosses between green and black wattle (*A. mollissima*). When green wattle formed the seed parent, all the hybrids were to some extent chlorotic in the early seedling stage. With black wattle as seed parent, 9 out of 45 seedlings were chlorotic. The high frequency of chimeras in back crosses with green wattle as pollen parent suggests the possibility that their occurrence is associated with this male parent. Cases of lethal chlorosis occurred among the progeny of silver wattle (*A. dealbata*) ♀ x black wattle ♂. Chlorosis was nonlethal in seedlings from silver ♀ x green wattle ♂. Chlorotic but fairly vigorous seedlings have been secured from black wattle x *A. baileyana.*
Two families of black wattle have provided evidence of linkage between pointed pinnules in the seedling leaf and dwarf habit, each character being monogenically determined. In another family, procumbent habit was lethal and behaved as a simple recessive. Each family of black wattle has distinct vegetative characters, but these are less well-defined in open-pollinated progeny than in selfed.
Progenies of colchicine-induced tetraploids have been planted. Triploid seedlings have been obtained from 4*n* trees grown in proximity to diploids.
Data from the progeny trial established in 1950 suggest that forking is a heritable character. The range of variation for basal area at a height of 4½ ft. was greater than for height. No significant differences were detected between families with respect to tannin content. Correlations of tannin content with stem diameter and bark thickness were however obtained. Tannin content and height were not correlated.
A. baileyana should prove the best species for breeding for frost resistance.
Investigations on the dispersal of black-wattle pollen by wind continued.

Gordon-Gray, C. G. A rapid method of determining the relative tannin content of young, living black wattle trees in genetical and breeding experiments. (pp. 42–48).

A suitable sampling technique and a spectrophotometric method of analysis are described by means of which relative values of tannin content can be determined in breeding and genetical experiments, when the trees are three years old.

1375 HUNZIKER, J. H.
Número de cromosomas de varias especies sudamericanas de "*Ephedra.*" **(Chromosome number of various South American species of *Ephedra*).**
Rev. argent. Agron. 1953 : **20** : 141–43.

The number $n = 7$ was encountered in *E. breana, E. triandra, E. tweediana* and some forms of

E. andina; one form of *E. andina* had a somatic number of 30 and is thought to be most probably a tetraploid with 2 monosomics.

1376 SATINA, S.
Chromosome end arrangements in *Datura inoxia*, *D. meteloides* and *D. metel*.
Amer. J. Bot. 1953 : **40** : 638–46.
The relationships of the chromosomes in types of the above three species with those of tester races of *D. stramonium* were determined by analysing the formation of bivalents, rings and chains in meiosis of the appropriate hybrids. No evidence has been obtained that number of segmental interchanges is directly related to speciation or incompatibility in interspecific hybridization.

1377 KAWATANI, T. & OHNO [ONO], T.
(On the cultivation of *Chenopodium ambrosioides*).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 49–52. [Japanese].
Typical *Ch. ambrosioides* exists in diploid ($2n = 16$), tetraploid and octoploid strains. Analyses of a number of strains have revealed considerable differences in content of ascaridole, some strains producing more than var. *anthelminticum*.

1378 EBES, K.
Verbetering van de stamvorm door selectie. **(Improvement of stem form by selection).**
Ned. BoschbTijdschr. 1951 : **23** : 1–7.
Wide variation in the form of the trunk is reported in the descendants of the *Cinchona ledgeriana* material introduced into Java in 1864. Till now selection has been chiefly for quinine content; the occurrence of individuals with superior trunk form, however, suggests that selection for this character would be worthwhile.

1379 **Report for years 1949-51 of the Botanical Division of the Rubber Research Institute of Malaya.**
Rubb. Res. Inst. Malaya 1953 : Pp. 112.
Details are given of interclonal crosses effected during the period 1949–51. New clones used for the first time were 34/162, a selection from the cross RRIM 504 x Tjir 1, and RRIM 83.
Data on clonal and seedling variety trials, showing yield and incidence of brown bast, are tabulated for the progeny of crosses made in 1937–41 and 1947–49.
An attempt was made to induce polyploidy in seedlings of *Hevea brasiliensis* by immersion in colchicine. Results are not yet conclusive.

1380 VAN HEUSDEN, W. C.
Aanbevolen heveaplantmateriaal 1953/1954. **(Recommended rubber planting material, 1953-54).**
Bergcultures 1953 : **22** : 359–65.
This communication from the experimental stations of the Central Association for the Administration of the Experimental Stations for Perennial Crops in Indonesia provides descriptions of recommended clones, seedlings and root stocks (cf. *PBA*, Vol. XXI, Abst. 1281).

1381 VOLLEMA, J. S.
Identificatiekenmerken van enige nieuwere *Hevea*-clonen. **(Characteristics by which some of the more recent *Hevea* clones may be identified).**
Arch. Rubbercult. Ned.-Ind. 1953 : **30** : 41–67.
Morphological characteristics and latex yield and quality of clones AV 385, LCB 479, PR 226, 228 and 231, RRI 501 and WR 101 are given. The data are intended to supplement a publication issued in 1939 describing the principal *Hevea* clones (cf. *PBA*, Vol. XI, p. 144).

1382 SILVA, C. A. DE
Clonal seed as planting material.
Adv. Circ. Rubb. Res. Inst. Ceylon 1953 : No. 39 : Pp. 8.
The question of propagation of rubber clones by means of clonal seedlings is discussed and difficulties are indicated. Unless great care is exercised, undesired interclonal crosses may occur, and even in the case of selfed seed, the seedlings do not breed true owing to the complex hybrid parentage of the mother clone. A general policy for estates producing clonal seed is outlined.

1383 YOUNG, H. E.
High rubber yields on the hills. Successful experiment by R.R.I.
Quart. Circ. Rubb. Res. Inst. Ceylon 1952 (1953) : **28** : Pts. 3–4: 20–21.
The rubber clone LCB 870, imported from Indonesia, has proved resistant to *Oidium* leaf disease when tested in the Matale district of Ceylon. LCB 870 has a vigorous growth and produces a high quality latex (cf. *PBA*, Vol. XXI, Abst. 2088).

1384 JOSEFSSON, A.
Förädlingsarbeten med gummimaskros. **(Breeding work with kok saghyz).**
Sverig. Utsädesfören. Tidskr. 1953 : **63** : 293–385.
Research on *Taraxacum kok-saghyz*, as a rubber-bearing plant, is reviewed with particular

reference to Swedish investigations, which are discussed under the following heads: the biology of flowering; leaf types and their inheritance; correlation studies of leaf shape, growth habit, root weight and rubber content; breeding aims, methods and results; induction of polyploidy and mutations; interspecific hybridization; flowering, and set and yield of seed; changes in germination capacity during storage; rubber and carbohydrate content of roots harvested at different times; depth of sowing in relation to emergence; lopping of flower stalks in relation to yield; and labour questions.

1385 Koroleva, V. A.
(Biological analyses of kok saghyz populations).
Trud. Prikladnoĭ Bot. Genet. Selekcii (Bull. Appl. Bot. Pl.-Breed.) 1948 : **28** : No. 1 : 163–74. [Russian].

Several biotypes, selected on the basis of their mode of ontogenesis from material flowering in the first year, are described. They had a higher rubber content but lower root yields than the so-called "winter" types, i.e. forms with a two-year growth cycle, and showed differences in respect of their earliness, hardiness and rubber yields, a perpetual form being the most productive. Plants within each biotype showed variability regarding their rubber content and root yield. These characters were also related to external conditions. It is concluded that productive varieties of kok saghyz must be selected separately for each district from (*a*) winter types producing high root yields, (*b*) early forms with a high rubber content and (*c*) intermediate forms such as the perpetual biotype. Mention is made of the variety 485 obtained by the first-named method by Bulgakov.

FRUITS AND NUTS

1386 **Report of the Thirteenth International Horticultural Congress 1952, London, 8-15 September.**
1953 : **1** and **2** : Pp. 1297.

Stearn W. T. (Editor). International code of nomenclature for cultivated plants. (pp. 42–68).

The full text of the Code formulated and adopted at the Congress (cf. p. 142 above) is presented.

Fruit Growing. (pp. 143–325).

Preston, A. P. Some new apple rootstocks. (pp. 267–81).

Some of the results of trials of the woolly-aphid resistant rootstocks of the MM series bred at the East Malling Research Station, Kent, England, are reviewed (cf. *PBA*, Vol. XXIII, Abst. 2923). The stocks were developed mainly from crosses of Northern Spy with rootstocks of the Malling (M) series.

Vegetable Growing. (pp. 327–439).

Banga, O. Denomination and evaluation of varieties of vegetables. (pp. 329–35).

With reference to experience in the Netherlands, a discussion is given of the definition of variety, the problems of identifying self-pollinated and cross-pollinated vegetables, and the practice of periodical trials carried out to determine the cultural value of varieties and to maintain the standardization of types and names.

Bateman, A. J. Methods of vegetable breeding. (pp. 336–44).

The reproductive systems of vegetables are examined in relation to the work of the breeder, and improvement by means of single plant selection, hybridization followed by selection, exploitation of hybrid vigour, progeny testing and strain building, and mass selection is discussed. The importance of mass selection and of placing this method on a scientific basis is stressed.

Haskell, G. Heterosis and adaptability. (pp. 365–74).

Definitions of hybrid vigour are examined, and the economic benefits of hybrid vigour are discussed in relation to the breeding systems and types of growth of horticultural crops. Observations at Merton, Surrey, England, have indicated that inbreds of sweet corn, introduced from the United States, are sexually less adaptable than the F_1 hybrids to changes of day length and light intensity. Using unrelated inbred, F_1 hybrid and open-pollinated strains of American sweet corn, variations in silking date, tiller number, leaf number and plant height were determined as a means of evaluating differences in adaptability. The coefficients of variation showed that for all characters, the hybrids varied *intra se* less than the open-pollinated varieties. The inbreds were more variable in silking date than the hybrids, more variable in height and tiller number than both hybrids and open-pollinated varieties, but less variable with respect to leaf number than the other two groups. The results are discussed in relation to balance in polygenic breeding systems; increased variability of inbreds under conditions of environmental adversity is regarded as a manifestation of inbreeding depression within a balanced outbreeding species.

Jones, H. A. Hybrid onions and the production of hybrid seed. (*pp. 396–402*).
The method of producing F_1 hybrid onion seed, using male-sterile lines, is described (cf. *PBA*, Vol. XV, Abst. 766). For the northern region of the United States, hybrids have been developed which, compared with the parent commercial varieties, Brigham Yellow Globe and Early Yellow Globe, are higher yielding, more attractive in appearance, and more uniform in bulb characteristics and time of maturing. The hybrids also keep better in storage and possess more retentive scales. For the southern United States, early hybrids have been produced which outyield the parent varieties Excel, L 690, CC 163 and Texas Early Grano 502. It is predicted that F_1 hybrids will gradually replace the standard varieties.

Sneep, J. Selection and breeding of some brassica plants. (*pp. 422–26*).
With reference to work at the Institute of Horticultural Plant Breeding, Wageningen, Netherlands, the importance of selecting at the right time, i.e. at the moment of harvesting and in relation to the usual practices of market growers, is stressed. This requirement often presents difficulties in seed production. Suitable techniques of vegetative propagation can however be devised to overcome this problem, as exemplified by methods used for cabbage and summer and winter cauliflowers. Inbreeding does not necessarily lead to loss of vigour in the cabbage, as shown by successive selfings of F_1 plants from a sib mating. With the cauliflower, evidence has been obtained that selfing may occur naturally and be more valuable in breeding than expected. For Brussels sprouts selfing is advisable as a breeding method. Selfing in pollination cages by homeless humblebee queens which are affected by the parasite *Sphaerularia bombi*, and are thus unable to produce eggs, has proved to be a less expensive and more effective method than bud-pollination by hand.

General lectures on plant breeding. (*pp. 506–601*).

Darrow, G. M. Breeding of small fruits in the United States. (*pp. 577–86*).
An historical survey of blackberry, raspberry, strawberry, blueberry, cranberry and grape breeding is presented.

Mather, K. The impact of genetical science on plant breeding. (*pp. 587–92*).
Differences between the aims of the breeder and geneticist are defined. A general discussion is then given of the part played in breeding by genetical research on such aspects as polygenic variation, breeding systems, the origins of cultivated plants, artificial polyploidy and the induction of mutations by X rays and other mutagens.

Wellensiek, S. J. The indirect service of genetics to breeding. (*pp. 593–601*).
The application of genetical principles to the following general problems and methods of breeding is discussed along the lines suggested by the author previously (cf. *PBA*, XXII, Abst. 2562; Vol. XIX, Absts. 471 and 1761; and Vol. XVII, Abst. 1529); mass *vs.* pedigree selection; incorporation of vegetative multiplication in the breeding programme; generative testing, by means of selfing in autogamous crops and polycrossing in allogamous plants; breeding perennials by generative testing, only the seed of the mother plants found to possess the best genotypes subsequently being used for propagation; breeding annual self-fertilizers by inbreeding for a number of generations, followed by selection and testing; breeding of annual cross-fertilizers, by introducing vegetative reproduction, using parts of each clone for a polycross test and other parts for maintaining the genotypes vegetatively or by seed; and repeated back-crossing.

Plant Breeding. (*pp.* 603–786).

Alderman, W. H. & Hutchins, A. E. Fruit and vegetable breeding in the United States. (*pp. 607–17*).
An historical survey is given of fruit and vegetable breeding.

Banga, O. New varieties of fruit and vegetables introduced in Holland in recent years. (*pp. 624–31*).
Fruit and vegetable varieties introduced since 1946 are surveyed, information being provided on their parentages and breeders. Full descriptions are omitted, but general type and differential characters are usually indicated.

Basse, H. Deutsche Gemüse- und Obstzüchtungen der neueren Zeit. (*German vegetable and fruit breeding in recent times*). (*pp. 631–42*).
The development of fruit and vegetable breeding in Germany since 1934 is described, and new varieties are listed. Considerable success was achieved with peas and beans.
Primavera, a new early sweet cherry of superior quality, and Magna Glauca, a new early frost-resistant plum, will be introduced shortly. The new Senga series of strawberries shows great promise.

Bremer, A. H. Norwegian vegetable and fruit varieties. (*pp. 643–48*).

Among the many varieties discussed, the following are considered to be of particular interest to breeders: the turnips Maalselv, with short leaves, and Sola and Forus, resistant to club root; the short-topped swede turnip Hylla; cabbages such as Rossebø and Limas Amager, with a short stalk and compact head, and thus suitable for storing; the medium-tall pole beans Reistad and Kvithamar; the leaf-mould resistant tomato Kvithamar; the sugar pea Kvithamar, from which both long-day and day-neutral plants have been selected; and the apples Haufmann, Prinsar, Fuhr, Torstein and Kaupanger.

Camp, W. H. Intra-specific genetic diversity in nature; its importance to the breeder and grower. (*pp. 648–54*).

The work of the biosystematist is revealing that genetically controlled variability within most naturally occurring species is much greater than was previously supposed, and that this variability may be much more marked in physiological reactions than in morphological characters. Sometimes cultural failures may perhaps be due to the introduction of an unsuitable biotype rather than to the inherent unfitness of a species, as, for example, in the case of the poor performance of American blueberries in Europe, and of *Fagus grandifolia* and *F. sylvatica* in Europe and the United States, respectively. In view of the intraspecific variability still untapped, plant explorers should aim at enriching the gene pool of species already in cultivation rather than at the discovery of entirely new species.

van Cauwenberghe, E. Comportement et appréciations de variétés fruitières essayées récemment en culture commerciale en Belgique. (*Characteristics and assessment of fruit varieties recently tested in commercial cultivation in Belgium*). (*pp.. 655–65*).

Difficulties confronting the breeder of new fruit varieties are discussed. It is often difficult to predict the future requirements of the buyer. New varieties are obtained from seed or by mutation. Recent varieties introduced from abroad, and approved for cultivation in Belgium, are listed.

Chopinet, R., Trebuchet, G. & Drouzy, J. Tendance de la culture légumière en France et variétés nouvelles. (*The trend of vegetable growing in France and new varieties*). (*pp. 666–73*).

An account of the development of vegetable cultivation in France is given, and the main vegetable producing areas are outlined. The progress achieved in breeding new varieties is described. This has not been spectacular. New varieties have been introduced from abroad, and in recent years an attempt has been made to compile a national catalogue of approved vegetable varieties.

Coutanceau, M. Impressions sur le comportement des variétés de pommiers d'origines étrangères introduites en culture en France depuis 1930. (*Impressions of the performance of foreign apple varieties introduced into France since 1930*). (*pp. 674–86*).

Many varieties of apple trees of foreign origin have been introduced into France since 1930. Data on these are tabulated, but it is stressed that few imported varieties have been outstanding. Exceptions are Golden Delicious, Red Delicious, Starking, Richard, Stayman Winesap, Winter Banana and Jonathan.

Crane, M. B. The genetics and breeding of fruit trees. (*pp. 687–95*).

It is emphasized that the quantitative inheritance of the chief characters of polyploid tree fruits and, to a lesser extent, of diploid fruits, raise considerable difficulties in breeding, in addition to the time factor involved. Investigations at the John Innes Horticultural Institute, England, are summarized, chiefly with reference to the following: the simple and polygenic inheritance of various characters in apples and other fruits; hybrids between pear and apple (cf. *PBA*, Vol. XXIII, Abst. 2939); resistance of the pear to *Venturia pirina* and physiological specialization in this fungus (cf. *PBA*, Vol. XXIII, Absts. 2166–7); breeding apple rootstocks resistant to woolly aphis, in conjunction with East Malling Research Station; resistance of the peach to mildew (*Sphaerotheca pannosa*) and its association with foliar glands; bacterial-canker resistance in cherries; and varietal response to chemicals used in disease control.

Emsweller, S. L. Developments in plant breeding due to the use of colchicine. (*pp. 696–707*).

Naturally occurring polyploidy, different methods of colchicine treatment, sterility in autotetraploids, the problem of chimeras as illustrated by those obtained by treating scales of *Lilium longiflorum*, and the future of colchicine-induced polyploidy are discussed, chiefly with reference to ornamentals but also with mention of other horticultural plants.

Granhall, I. Aims, methods and results of Swedish fruit tree breeding. (*pp. 707–11*).

A review is given of apple, pear, plum and cherry improvement at the Balsgård Fruit Breeding Institute, southern Sweden, by means of hybridization, including crossing between forms with different chromosome numbers, bud sports, and mutations induced by treatment with X rays, neutrons or radioactive isotopes (cf. *PBA*, Vol. XXIII, Absts. 605, 2152 and 2157).

Kajiura, M. New varieties of fruits, vegetables, and flowers introduced in Japan in recent years. (*pp. 712–17*).

The provisions of the Agricultural Seeds and Seedlings Law inaugurated in 1947 in Japan are outlined. Descriptions are given of the following five varieties among the 50 new ones already registered under this law. The chestnut Hayashi, from open-pollinated seed of the F_1 between early maturing varieties of *Castanea crenata* and *C. mollissima*, has good quality nuts, with pellicles more easily removable than those of *C. crenata*. The navel orange Ukumori, a bud sport of Washington, matures two weeks earlier than the parent variety and is particularly high yielding, in spite of heavy rainfall and high temperature in summer. An early-maturing strain of persimmon, known as Matsumoto Wase Fuyu, originated from a bud sport of Fuyu. The mosaic-resistant Japanese radish Takakura was developed from a cross between Nerima and a mosaic-resistant variety. The pumpkin Shin-tosa, an F_1 hybrid between improved selections of *Cucurbita moschata* and *C. maxima*, is heat resistant, high yielding and superior in quality.

Kobel, F. La création de nouvelles variétés de fruits et de légumes en Suisse durant les dernières années. (*The development of new fruit and vegetable varieties in Switzerland during the last few years*). (*pp. 718–24*).

An account is given of the work of the Research Stations at Wädenswil and Lausanne, and new varieties of fruit and vegetables developed in Switzerland are listed.

Kristensen, R. New varieties of fruit and vegetables introduced in Denmark during recent years. (*pp. 725–31*).

Fruit and vegetable breeding and the Danish system of testing are described, reference being made to varieties of apple, cherry, strawberry, cucumber, cauliflower, cabbage, Brussels sprouts, celeriac, spinach, lettuce, onion, leek and peas.

Potter, J. M. S. New varieties of fruit in the United Kingdom. (*pp. 732–38*).

In view of the length of time taken before the commercial establishment of a hardy fruit variety, the term new is applied to tree fruits introduced during the past 50 years and to small fruits introduced during the past two decades. On the basis of this definition, a discussion is given of varieties of apple, pear, cherry, plum, strawberry, raspberry, black and red currants, gooseberry and blackberry bred at the East Malling Research Station, John Innes Horticultural Institution and elsewhere.

Reid, R. D. Breeding strawberries resistant to red core root rot. (*pp. 739–50*).

An account is given of breeding for resistance to red core combined with freedom from other diseases carried out since 1933 by the Department of Agriculture for Scotland with the collaboration of the West of Scotland Agricultural College, Auchincruive. Very few genetically distinct sources of resistance have been discovered. The two chief sources used have been No. 52 [? = Frith] and the American variety Aberdeen; these are the parents of the only named variety so far introduced, Auchincruive Climax (cf. *PBA*, Vol. XVIII, Abst. 1855). The variety Little Scarlet (? *Fragaria virginiana*) when crossed with Aberdeen gives a very high proportion of resistant seedlings; the intensification of resistance persisted in the F_3 but was linked with unsatisfactory fruiting characters. Perle de Prague has been used recently, but the results obtained cannot yet be assessed. The effect of parentage upon red-core resistance is discussed; with two resistant parents, rarely more than 30% of the seedlings show red core in the first two years of testing. The problem of breeding for resistance to red core is further complicated by physiological specialization of the fungus.

Vilmorin, R. de. La sélection des plantes de jardin. (*The selection of garden plants*). (*pp. 761–70*).

The selection of new and improved varieties is based on hybridization, the production of mutations and induced polyploidy. Utilization of heterosis in F_1 hybrids will become of increasing importance in plant breeding.

Seeds. (*pp. 999–1090*).

Bateman, A. J. Problems of isolation in seed growing. (*Extended summary*). (*pp. 1013–15*).

General methods of securing isolation between interfertile forms and special factors requiring

consideration in the case of species pollinated by insects or wind are summarized.

Horne, F. R. The testing and maintenance of improved strains of vegetables. (*pp. 1051–60*).

With reference to vegetable varieties and strains in the United Kingdom and tests carried out by the National Institute of Agricultural Botany, Cambridge, the following topics are considered: correct nomenclature of varieties and strains to be evaluated; regional effects of climate and soil type: effects of variation in soil fertility and spacing; specific physiological tests; study of disease resistance; seasonal productivity of different varieties; differences in quality; production and multiplication of stock seed; and methods of producing vegetable seed of the highest quality.

Salisbury, E. J. Seed variation and its significance. (*pp. 1067–70*).

Considerable morphological and physiological variation, which may be discontinuous, is shown by the seeds of some species. This variability may possibly have survival value under natural conditions, by increasing the range of dispersal, but it raises fundamental questions as to how natural selection has resulted in the different types of seed of a single species. Since seed size and the total number of seeds produced by a species show a broad negative correlation, and since small seed size does not appear to be disadvantageous under the less competitive conditions of artificial cultivation, selection for higher yielding, small-seeded types is regarded as justifiable in suitable horticultural species.

Weibull, G. The cold storage of vegetable seed and its significance for plant breeding and the seed trade. (*pp. 1083–90*).

Storage of seeds of several vegetables and flowers at —20° C and 85–95% relative humidity has proved satisfactory as a long-term method of seed preservation at the Weibullsholm Plant Breeding Institute, Landskrona, Sweden. The significance of the method to breeders and seedsmen is indicated.

Tropical and sub-tropical horticulture (*pp. 1091–232*).

Akenhead, D. & Argles, G. K. Some problems of tropical horticultural research. (*pp. 1093–99*).

The organization of tropical horticultural research, breeding and other projects suggested as likely to be valuable, and problems of the dissemination of information are discussed.

Baptist, E. D. C. Recent progress in Malaya in the breeding and selection of clones of Hevea brasiliensis. (*pp. 1100–21*).

Breeding and selection carried out since 1928 at the Rubber Research Institute, Malaya, is surveyed. The chief characters for which selection has been practised, and methods of hand pollination, selection and testing are described in detail. The results or progress of three sets of hand pollinations are then summarized: (1) Series 1–7, made during the period 1929–32, and from which the RI '500' series of clones originated; (2) series 8–12, initiated in 1937, and giving rise to the RI '600' series; and (3) series 13–17, carried out during the years 1947–51, and in which clones of the RRI '600' series have been used in wide crosses and back crosses. Later selections of the RRI '600' series have shown particular promise with respect to yield and secondary characters; it is hoped that they will prove more suitable for commercial planting than the RRI '500' series.

Black, M. W. The problem of prolonged rest in deciduous fruit trees. (*pp. 1122–31*).

The most satisfactory solution of the problem of prolonged rest lies in the acquisition of more adaptable varieties by selection and breeding. In recent years considerable progress has thus been achieved in South Africa, particularly with the peach.

Dodds, K. S. & Hawkes, J. G. Potatoes in the tropics. (*pp. 1132–37*).

In tropical South America, varieties of *Solanum tuberosum* subsp. *andigenum* give a fair yield of tubers at altitudes ranging from 10,000 to 13,500 ft., whereas European and North American varieties, whether early or late maturing, are unable to thrive at such altitudes. European and North American potatoes can give good yields in the tropics at medium altitudes of approximately 1300–8000 ft., they may even thrive at sea-level if grown in localities with a marked cool season. In view of the poor performance of *andigenum* varieties below 10,000 ft., they cannot be regarded as valuable material for breeding in the tropics. Selection of hybrid progenies from crosses between domestic varieties of the northern hemisphere, or of tetraploid lines already established from interspecific crosses by workers in temperate countries, is likely to be more profitable as a comparatively short-term basis of improvement.

Evans, G. Some account of variety collections of tropical agricultural crops and of the problems involved. (*pp. 1169–79*).

The general problems of crop collection and introduction are discussed on an international basis, and the progress so far achieved by FAO in the organization of the maintenance of collections and in cataloguing genetic stocks is outlined. An account is given of some of the chief collections of tropical crops now established in the countries of the British Commonwealth and other parts of the world.

Krug, C. A. & Carvalho, A. Coffee breeding. (*pp. 1199–209*).

A survey is given of the variability of the main economic species of *Coffea*, the cytology and genetics of the genus, floral biology, and breeding methods, mainly with reference to investigations at the Instituto Agronômico, Campinas, São Paulo, Brazil (cf. *PBA*, Vol. XXIII, p. 348–9). Means of improvement studied at the institute comprise individual plant selections and progeny testing, intervarietal and interspecific hybridization, the possible exploitation of hybrid vigour, study of new mutants and chance hybrids, and breeding for resistance to *Hemileia*.

Benton, R. J., Bowman, F. T., Fraser, L. & Kebby, R. G. The significance of Poncirus trifoliata *for citrus rootstock problems.* (*pp. 1235–40*).

From investigations in New South Wales, *P. trifoliata* has been found to be the best genetic source of resistance to *Phytophthora citrophora*. This species and its hybrids are therefore being selected to obtain material for rootstock trials.

1387 Linder, R.
Étude des conditions de fécondation dans des populations naturelles de pommiers et de poiriers de la région de la Hart. 1. Observation de léthalité pollinique en ségrégation monofactorielle. (**A study of the conditions of fertilization in the natural populations of apples and pears in the Hart district. I. Evidence of pollen inviability in monofactorial segregation**).
Bull. Soc. Bot. Fr. 1953 : **100** : 144–45.

The incidence of normal and abnormal pollen in 113 wild apple and pear trees in three populations growing in different forests in the Hart district indicates that hereditary factors in the cultivated apple may also occur in wild forms and, in the case of the gene p_1, even in a wild pear (cf. *PBA*, Vol. XXII, Abst. 2953). This finding might be interpreted as suggestive of a common ancestry for the apple and pear.

1388 Chevalier, A.
L'origine des poiriers et pommiers sauvages de nos forêts et la part qu'ils ont prise dans la formation des variétés cultivées. (**The origin of the wild pear and apple trees in our forests and the part they have played in the creation of the cultivated varieties**).
CR Acad. Sci., Paris 1953 : **237** : 1193–96.

The various types of wild forms of apple and pear and their distribution in France are described. The so-called wild forms are a combination of types originally indigenous to Europe and semi-cultivated forms imported from Asia in the wake of early tribal migrations. Our present-day commercial varieties are derived from this intermixture.

1389 Schmidt, M.
Beiträge zur Züchtungsforschung beim Apfel. II. Morphologisch-pomologische Studien an F_1-Sämlingen der Kreuzung einer Kultursorte mit *Malus niedzwetzkyana*. (**Contributions to research on apple breeding. II. Morphological-pomological studies of the F_1 progeny of a cross between a cultivated variety and *M. niedzwetzkyana***).
Züchter 1953 : **23** : 327–34.

M. niedzwetzkyana, an uncultivated species possessing red leaves, red-skinned fruit and a high anthocyanin content, was crossed with the cultivated variety, Ernst Bosch, which has green leaves, a golden yellow fruit and no anthocyanin.

The F_1 progeny gave 36 trees with varying degrees of red coloration of the leaves, and 50 trees with leaves varying from light to dark green. The colour of the petals varied from dark red to white, with many intermediate stages. Red petals were closely linked with red leaves. Differences in number and arrangement of petals were noted.

Many intermediate stages in fruit skin and flesh colouring were observed. All the hybrids contained some anthocyanin, indicating that Ernst Bosch contains latent genes for anthocyanin.

Many of the hybrids produced fruit of good quality which was not, however, of sufficiently high standard for commercial purposes. It is intended to cross these hybrids with leading apple varieties to transfer their frost resistant qualities, inherited from *M. niedzwetzkyana*, to commercial strains.

It is suggested that those hybrids with red fruit

and foliage may be valuable for ornamental purposes; in addition, the fruit is edible and yields a high quality juice.

1390 **(Research at the I. V. Mičurin Scientific Research Institute of Horticulture).**
Sad i Ogorod (Gdn. & Veg. Gdn.) 1953 : No. 10 : 73–75. [Russian].

In the 1952 trials, Severnyĭ Sinap [Northern Sinap] outyielded other apple varieties bred at the Institute, proved hardy, and showed resistance to scab. The fruits had good keeping properties and flavour.

Agrobiological tests of various forms of Chinese crab are in progress. Kitaĭka Pozdnjaja Zimnjaja [Late Winter Chinese Crab], is interesting for its productiveness, hardiness and the good keeping properties and quality of its fruit.

1391 Breviglieri, N.
Studi e ricerche sulla biologia fiorale e di fruttificazione del melo nel Ferrarese. **(Studies and investigations on the biology of flowering and fruiting of the apple in the province of Ferrara).**
Ann. Sper. agr. 1953 : **7** : 1731–87.

This bibliography of 56 pages, which completes the previous reports (cf. Abst. 582) on experimental studies of the biology of flowering of the apple, also contains some references to the pear.

1392 Pešina, K.
Klíčivost pylu u jabloní. **(Germination of the pollen of apple trees).**
Spisy Přírodovědeck. Fak. Univ. Karlovy 1948 : **194** : 123–27.

Of the varieties tested, Parména Zlatá [Golden Pearmain], Panenské České [Czech Maid] and Londýnské [London Pippin] had the highest percentages of fertile pollen.

1393 **New Iowa apple resists fire blight.**
Iowa Fm Sci. 1953 : **8** : No. 5 : 10–11.

A new variety developed from Jonathan x Delicious at the Iowa Agricultural Experiment Station shows marked resistance to fire blight. Sharon (McIntosh x Longfield) and Hankeye Greening, both introduced in 1922, are partially resistant to fire blight.

1394 Shay, J. R. & Williams, E. B.
Physiologic specialization in *Venturia inaequalis*.
Phytopathology 1953 : **43** : 483–84. (Abst.).

Approximately 30 clones, representing 14 species of *Malus*, showed resistance to *V. inaequalis* when tested with strains from the United States and other countries. In 1951, however, two new races, designated 2 and 3, occurred in South Dakota and Nova Scotia, respectively. Race 2 was differentiated from the commonly occurring race 1 by its capacity to attack *M. baccata* and some derivatives of the Russian type R 12740–7A. Race 3 was distinguished by its ability to infect Geneva.

1395 Julien, J. B.
Essai visant à sélectionner des semis de pommier résistants à la tavelure. **(An experiment aiming at breeding apple seedlings resistant to scab).**
Rep. Quebec Soc. Prot. Pl. 1950–1951 : Nos. 32 & 33 : 215–17.

Having reviewed the present position regarding seedling resistance to *Venturia inaequalis*, the writer described his technique of repeated inoculation, grading and selection for resistance to obtain material for crossing in order to breed resistant trees.

1396 Mulder, D.
Magnesiumgebrek en andere oorzaken van chlorose en necrose. **(Magnesium deficiency and other causes of chlorosis and necrosis in fruit trees).**
Med. Dir. Tuinb. 1953 : **16** : 878–82.

Several types of necrosis and chlorosis in fruit trees, brought about by nutritional deficiency and virus diseases, are described. Golden Delicious and Jonathan are extremely susceptible to apple mosaic diseases and breeding for resistance in these varieties is necessary.

1397 Marinucci, M.
La "Butirra Clairgeau." **(Beurré Clairgeau).**
Ital. agric. 1953 : **90** : 767–68.

Information is given on the origin, characteristics and suitable pollinators for this pear, which has been used as a parent by both Morettini and Pirovano in breeding pears for Italy.

1398 Zvoničková-Sosnová, V.
Klíčivost pylu kulturních odrůd hrušní. **(The germination of the pollen of cultivated varieties of pear trees).**
Spisy Přírodovědeck. Fak. Univ. Karlovy 1948 : **194** : 119–22.

Of 36 varieties of pears tested for pollen germination, Clapp's Favourite, Doyenné du Comice, Beurré de Blumenbach, Beurré Napoléon, Madeleine and Grise Bonne gave the highest percentage of fertile pollen, between 80 and 90%.

1399 Dunegan, J. C., Moon, H. H. & Wilson, R. A.
A rapid method for mass inoculation of pear trees with the blight organism.
Plant Dis. Reptr. 1953 : **37** : 14–15. (Mimeographed).

A method of mass-inoculating pear seedlings

with blight bacteria by means of a power sprayer is described. Hybrids under observation in the breeding programme at the Plant Industry Station, Beltsville, Md., are being evaluated by means of this technique.

1400 Sokolova, O. V.
(***Chaenomeles Maulei* C. K. Schn.**).
Trud. Bot. Inst. Akad. Nauk SSSR (Proc. Bot. Inst. Acad. Sci. USSR) 1952 : Ser. 6 : 150–52. [Russian].

A description of this plant, with notes on its propagation, is given. Its fruits show variability in respect of their shape and flavour and it is regarded as promising material for breeding and selection.

1401 Hesse, C. O.
Burmosa and Redheart.
Bull. Calif. Agric. Exp. Sta. 1952 : No. 735 : Pp. 15.

Two new plum varieties, Burmosa and Redheart, are described. Burmosa is a selection from Burbank ♀ x Formosa ♂. It matures early, produces a large fruit of firm texture and stores well. The flavour is moderately sweet and mild and the flesh colour light. Redheart is a selection from Duarte ♀ x Wickson ♂. It is similar to Duarte, but does not crack as readily. Redheart is valuable as a pollinator of Elephant Heart.

1402 Bulanda, M.
Badania stosunków wzajemnego zapylania się czereśni, wiśni i czerech. (**A study of the conditions of interpollination between sweet, sour and Duke cherries**).
Roczn. Nauk rol. 1953 : Ser. A : **66** : No. 4 : 95–114.

This research, carried out at the University Horticultural Institute at Cracow, records the results of investigations on the artificial self pollination and cross pollination of 20 varieties, comprising sweet, sour and Duke cherries. The degree of self fertility and interfertility of the varieties is shown in tables and discussed.

1403 **Peaches and nectarines.**
N. Jersey Peach Coun. Inc., N. Brunswick, Fall 1953-Spring 1954 : Pp. 3.
Name two more Blake peaches.
N.J. Agric. 1953 : **35** : No. 5 : p. 6.

Descriptions of two new peach varieties, M. A. Blake (NJ 117) and Sunrise (NJ 133), are included in this issue of the list (cf. *PBA*, Vol. XXII, Abst. 1397). M. A. Blake, a yellow-fleshed freestone type, ripens about a week later than Elberta; its large fruits hang well for several days after turning bright yellow, and are especially suitable for canning and freezing. Sunrise ripens 10–14 days earlier than Jerseyland, producing yellow-fleshed, medium-sized fruits which, when fully ripe, are almost of the freestone type. Both varieties are hardy and resistant to bacterial spot.

1404 **New peach for south.**
Amer. Nurserym. 1953 : **98** : No. 7 : p. 45.

The early yellow-fleshed peach Coronet, from a cross between Halehaven and Dixigem, has been released by the US Department of Agriculture. When fully ripe, it is a near-freestone type. The variety is recommended as a substitute for Dixigem in trial plantings.

1405 Morettini, A.
Nuovi peschi Morettini: la Precocissima, la Gialla di Firenze. (**New Morettini peaches, Precocissima and Gialla di Firenze**).
Ital. agric. 1953 : **90** : 631–43.

Brief descriptions are given of 12 of the author's previously released peach hybrids which give a range of maturity dates extending from the middle of June to the middle of August in the neighbourhood of Florence. The new hybrid Precocissima Morettini [Morettini's First-early] matures at the same time as Fior di Maggio [Mayflower], beginning in the first ten days of June. It is a hybrid of Chilon x Fior di Maggio 37 T, has white flesh and is more vigorous than Fior di Maggio and other early varieties; its fruits are somewhat larger and are more suitable for transport and for storing.
Gialla di Firenze [Florence Yellow] is a yellow-fleshed hybrid from the cross Morettini Free Yellow x Trionfo 33 T; it is very vigorous and productive and ripens in the middle of July at the same time as Marigold and Golden Jubilee; its fruit is also distinguished by high keeping capacity and suitability for transport.

1406 Kitajima, H.
(**Studies on peach anthracnose**).
Tokai Kinki Nogyo Shikenjo Engeibu Kenkyu Hokoku/Bull. Hort. Div. Tokai-Kinki Agric. Exp. Sta. 1952 : No. 1 : 72–104. [Japanese].

An account is included of varietal reaction to *Gloeosporium laeticolor*; the most resistant varieties were Hakuto [White peach], Takakura, Okubo and Kanto 1 [Canning peach 1]. Resistance

was not correlated with the content of tannin or amygdalin in the young fruit.

1407 Iwasaki, T.
(Investigations on citrus seeds and seedlings).
Tokai Kinki Nogyo Shikenjo Engeibu Kenkyu Hokoku/Bull. Hort. Div. Tokai-Kinki Agric. Exp. Sta. 1952 : No. 1 : 34–48. [Japanese].

Seedlings were reared from a large number of citrus species and varieties to obtain new root-stocks. Preliminary data are given on seed production in the parents, and on the vigour and resistance to cold of the seedlings.

1408 Fukuda, J.
(Studies on the resistance of citrus to *Prontaspis yanonensis*. I. On the resistance of *Citrus natsudaidai* and *C. junos*).
Tokai Kinki Nogyo Shikenjo Engeibu Kenkyu Hokoku/Bull. Hort. Div. Tokai-Kinki Agric. Exp. Sta. 1952 : No. 1 : 128–41. [Japanese].

Both these species are resistant to the above pest. On *C. natsudaidai*, larval growth is retarded; on *C. junos*, the larvae fail to develop at all and soon die.

1409 Samson, J. A.
Sinaasappelvarieteiten in Suriname. **(Varieties of oranges in Surinam).**
Surinaam. Landb. 1953 : **1** : 7–10.

A brief historical note on orange cultivation in Surinam is followed by a list of the 13 varieties at present available at the Agricultural Research Station. Their external characteristics, the chemical constituents of the juice at different stages of ripening and the time taken to reach maturity are discussed.

1410 Al 'Azzuni, M. M., Salim, H. H. & Istinu, J. R.
(Some preliminary results of crossing imported citrus varieties with local varieties).
'Ulum Zira'. (Agric. Sci.), Cairo 1952 : **5** : 67–72. [Arabic].

During 1938–39, the Faculty of Agriculture, Cairo, imported some orange varieties from the USA, Malta and Morocco in order to cross them with local varieties. Notes are given on the performance of the introduced varieties after grafting on various stocks and planting out in the faculty's orchard.

1411 Iwasaki, T., Nishiura, M. & Akiyama, H.
(Experimental results with strains of the Unshu mandarin. II).
Tokai Kinki Nogyo Shikenjo Engeibu Kenkyu Hokoku/Bull. Hort. Div. Tokai-Kinki Agric. Exp. Sta. 1952 : No. 1 : 16–33. [Japanese].

A series of strains of the Unshu (= Satsuma) mandarin grown in Japan were compared in respect of vigour, fruit yield, earliness, fruit size and shape, sugar and acid contents, behaviour during storage, and seed set. The best all-round strain was Silverhill, followed by Hayashi, Sugiyama and Ishikawa.

1412 Aleksandrov, A. D.
(Indoor cultivation of citrus fruits).
Priroda (Nature) 1953 : No. 10 : 106–11. [Russian].

Varieties of lemon adapted to indoor cultivation in different geographical zones of the USSR are listed, including some developed in recent years at Sverdlovsk, Kursk, Maĭkop, Odessa, and in Azerbaĭdžan and Uzbekistan.

1413 Toledo, I. D. de
Mutação somática em *Citrus limon*. **(Somatic mutation in *C. limon*).**
Bragantia 1952 : **12** : 91–92.

Sweet limes were found to give only sweet fruits when either selfed or pollinated with sour lime, and sour limes gave only acid fruits both on selfing and cross pollination. Sweet lime trees sometimes bear one or more branches with bronze-coloured young leaves and pink flowers, like those of the sour lime, and these branches also bear acid fruits. They evidently arise by somatic mutation.

1414 Donno, G.
Alcune varietà bifere di fico coltivate in Provincia di Lecce. **(Some dual-bearing varieties of fig in the Lecce province).**
Ann. Fac. Agr. Portici 1950-51 : **19** : 89–106.

Donno, G.
Alcune varietà unifere di fico coltivate in Provincia di Lecce. **(Some single-bearing varieties of fig cultivated in the Lecce province).**
Ibid. 1950-51 : **19** : 167–95.

In the first article, descriptions are given of six dual-bearing varieties that have been cultivated in the Lecce province of Italy from time immemorial on account of their excellent

quality and low cultural requirements. The second article contains similar descriptions of ten varieties in which only the true figs develop.

1415 Donno, G.
La determinazione di alcune varietà di fico della Provincia di Lecce nel periodo invernale. (**Identification of some fig varieties of the Lecce province during the winter**).
Ann. Fac. Agr. Portici 1950–51 : **19** : 49–54.
Studies of 17 fig varieties during the winter period showed that certain characters of the new wood could serve for identifying fig varieties when devoid of their leaves. A diagnostic key based on these characters is presented and the characteristics of the varieties are illustrated in a series of photographs.

1416 Ishida, Y.
(**Cytological studies on plants of the genus *Morus*. I. Chromosome numbers of some mulberry trees**).
Kyushu Daigaku Nogakubu Gakugei Zasshi/Sci. Bull. Fac. Agric. Kyushu Univ. 1951 : **13** : 49–52. [Japanese].
In *M. alba*, *M. cordatifolia* and *M. atropurpurea*, $2n = 28$.

1417 Beaumont, J. H.
Guava variety selection started.
Hawaii Fm. Sci. 1953 : **2** : No. 1 : p. 7.
A selection programme, designed to improve the quality of guavas grown in Hawaii has been initiated. Both local and imported varieties are being tested for vitamin content, flavour, colour and yield.

1418 Pasenkov, A. K.
(**A hybrid form of persimmon**).
Bjull. glav. bot. Sad. (Bull. princ. bot. Gdn.) 1952 : **14** : 95–96.
A natural hybrid between *Diospyros kaki* and *D. lotus*, found in the Kobuleskiĭ district, Adžar ASSR, is described. It is interesting for its high yields of good quality fruits and monecious habit.

1419 Skallerup, H. R.
The distribution of *Diospyros virginiana*.
Ann. Mo. bot. Gdn. 1953 : **40** : 211–25.
The distribution of *D. virginiana* in the United States is described. Attention is drawn to the existence of two chromosome races, one with $2n = 60$ and the other with $2n = 90$. The former occurs in and around the ancient centre of the species in the east, whereas the latter is found in the periphery of the area of distribution. Tentative explanations of the occurrence of these races are briefly given.

1420 Albo, G.
La riproduzione e la ripartizione dei sessi nella *Ceratonia Siliqua* L. (**The reproduction and distribution of the sexes in *C. Siliqua* L.**).
Nuovo G. bot. ital. 1951 : **58** : 60–72.
Carob varieties fall into three sexual categories: diecious, hermaphrodite and polygamous types. Notes are given on the distribution and history of these forms.

1421 Francini, E.
Osservazioni sulla sessualità di *Ceratonia Siliqua* L. (**Observations on sex in *C. Siliqua* L.**).
Nuovo G. bot. ital. 1951 : **58** : 423–40.
The comparative embryology of hermaphrodite and diecious forms of the carob is described. Out of three offspring obtained from a hermaphrodite plant, one was hermaphrodite and two were female. The possible mode of evolution of sex in *C. siliqua* is discussed.

1422 **New pecan variety.**
Amer. Nurserym. 1953 : **98** : No. 5 : p. 56.
The early maturing variety Barton, developed from the cross Moore x Success at the US Pecan Field Station, Brownwood, Tex., is a moderately heavy yielder, producing very thin-shelled nuts and kernels with good keeping quality.

1423 Goislard, P. H.
Recherches forestières en France. Reconstitution des châtaigneraies. (**Forestry research in France. Reconstitution of chestnut groves**).
Forêt et Conserv. 1953 : **19** : No. 6 : 47, 49.
Quebec foresters are provided with an account of research in France on breeding for resistance to *Phytophthora* and *Endothia* in chestnuts (cf. *PBA*, Vol. XXIII, Abst. 2959).

1424 McKay, J. W. & Crane, H. L.
Chinese chestnut—a promising new orchard crop.
Econ. Bot. 1953 : **7** : 228–42.
The blight-resistant Chinese chestnut (*Castanea mollissima*) shows promise for nut production in the United States. More extensive seedling selection is required. Recently three new varieties, Nanking, Meilung and Kuling, have been released by the US Department of Agriculture (cf. *PBA*, Vol. XX, Abst. 1135); mention is also made of the promising new variety Abundance.

1425 FUKUDA, J. & OKUDAI, S.
(**Studies on the resistance of *Castanea crenata* to *Dryocosmus kuriphilus*. I**).
Oyodobutsugaku Zasshi (J. Appl. Zool.) 1951 : **16** : Pp. 10. [Japanese].

A list is given of Japanese varieties resistant or susceptible to the above pest. Oviposition occurs on the resistant varieties but the larvae gradually die.

1426 L'amandier. (**The almond**).
Minist. Agric., Paris 1948 : Pp. 48.

This publication is the first of a series on fruit production in France and deals briefly with the following aspects of almond production in that country; the chief regions of cultivation; diseases and pests; and the main types of cultivated varieties, which are individually described, with coloured plates of the nuts and with notes on their qualities and defects. The soil requirements and the uses of a few recommended varieties are also mentioned.

1427 DE PRETER, E.
L'amélioration de l'arachide à Gandajika. (**The improvement of the groundnut in Gandajika**).
Bull. INEAC 1953 : **2** : 183–96.

Accompanied by specimen breeding charts, an account is given of the way in which modern methods of selection, breeding and cultivation are applied to the improvement of yield and quality at the Gandajika Experimental Station in the Belgian Congo (cf. Abst. 930).

1428 CAUBÈRE, P.
L'arachide en France. (**The groundnut in France**).
Oléagineux, Paris 1953 : **8** : 535–38.

In connexion with investigations on the possibility of groundnut culture in France, Larroque's method of selection (cf. *PBA*, Vol. XXIII, Abst. 2503) has been applied for improvement of quality. The breeding material includes two varieties of Spanish origin, AM1 and AM2, intended for oil production, and two varieties for edible nut production, AM3 from Spain and AM4 from Madagascar.

A collection of varieties has also been assembled from groundnut-producing countries, to study varietal reactions to French conditions and, possibly, to provide parents for future crosses.

1429 DUFOURNET, R.
Essais comparatifs variétaux sur arachides à la station de l'Alaotra (Madagascar). (**Comparative variety trials of groundnuts at the Alaotra station, Madagascar**).
Oléagineux, Paris 1953 : **8** : 671–76.

Of 20 varieties of groundnut included in the trials, Valencia 247, Hybride 33 [Hybrid 33]and Buitenzorg 214 gave the highest yields on all types of soil. The two former varieties are also commercially preferable to the other varieties tested.

1430 EICHHORN, A.
Étude caryologique des palmiers. 1. (**A caryological study of palms. 1**).
Rev. Cytol., Paris 1952 : **13** : 153–315.

The following chromosome numbers are reported: *Calamus scipionum* ($2n = 28$), *Pinanga coronata* ($2n = 28$), *Thrinax argentea* ($2n = 36$), *Chamaedorea pumila* ($2n = 26$), *Cocos weddeliana* ($2n = 32$), *Livistona australis* ($2n = 36$), *L. olivaeformis* ($2n = 36$), *Phoenix porphyrococa* ($2n = 28$), and *P. roebellini* ($2n = 28$).

1431 SAAKOV, S. G.
(**Results of introductions of palms to the territory of the USSR**).
Trud. Bot. Inst. Akad. Sci. SSSR (Proc. Bot. Inst. Acad. Sci. USSR) 1952 : Ser. **6** : 16–75. [Russian].

Species and forms introduced into Russia from 1878 to 1950 are listed, with notes on the acclimatization of 21 species in the Soviet subtropics. Mention is made of a natural hybrid between *Butia eriospatha* and *B. capita* that produces good quality fruits under the climatic conditions of Suhumi.

1432 BALDINI, E.
Contributo allo studio delle razze di olivo coltivate in Toscana. Indagini condotte in provincia di Firenze. Parte II. (**A contribution to the study of the olive varieties cultivated in Tuscany. Investigations carried out in the province of Florence. II**).
Ann. Sper. agr. 1953 : **7** : 1853–85.

Descriptions and illustrations are given of 14 of the olive varieties less widespread in Tuscany (cf. Abst. 617). Suggestions are made regarding (1) pollinators for the different varieties, and (2) the varieties suitable for various climatic areas of the province.

1433 FRANCESCONI, F.
Contributo allo studio delle razze di olivo dell'Umbria. (**A contribution to the study of the olive varieties of Umbria**).
Ann. Sper. agr. 1953 : **7** : 1709–30.

The olive varieties in Umbria are described and illustrated. The best adapted to the region is Moraiolo which yields a large crop of fruits with a high oil content and is hardy in poor soil and resistant to *Cycloconium oleaginum*; some strains seem resistant to cold. The variety Leccino is

recommended for attempts to extend olive plantations to the plains.

1434 Singh, R. N.
Colchicine induced polyploidy in papaya (*Carica papaya*).
Sci. & Cult. 1953 : **19** : No. 1 : p. 44.

Two tetraploid male plants ($n = 18$) induced by colchicine treatment of the shoots at the Fruit Research Station, Saharanpur, Uttar Pradesh, showed a number of gigas characters. Germination tests and acetocarmine staining indicated that the pollen grains were sterile. Two female plants believed to be tetraploids are also under investigation. Application of a 1% solution for 12 hours was the most satisfactory treatment.

1435 Zentmyer, G. A.
Resistance to *Phytophthora* root rot of avocado.
Phytopathology 1953 : **43** : p. 490. (Abst.).

Persea skutchii seedlings have shown resistance to *Ph. cinnamomi* in tests to find resistant root stocks for California. Other species from Mexico and Central America are to be studied. *P. borbonia* seedlings from the southern region of the United States are immune or highly resistant, but this species is graft-incompatible with avocado. Several apparently resistant seedlings from named varieties in southern California are to be further tested.

1436 Shoji, K., Arisumi, T. & Nakayama, M.
Avocado types chosen for export.
Hawaii Fm. Sci. 1953 : **2** : No. 1 : 3, 6.

Different varieties of avocado were compared as to size, shape, thickness of skin, fat content and keeping quality. Fourteen varieties producing fruit of a sufficiently high standard for export are listed.

1437 Vaarama, A.
Cytology of hybrids between Pacific *Rubi Ursini* types and an eastern blackberry.
Amer. J. Bot. 1953 : **40** : 565–70.

A hexaploid ($2n = 42$), an octoploid ($2n = 56$) and a decaploid ($2n = 70$) member of the *Rubus ursinus* complex from the Pacific coast of N. America, and the Loganberry, were crossed with the tetraploid ($2n = 28$) blackberry variety Macatawa (= Texas Early) at the State Horticultural Institute, Piikio, Finland. Microsporogenesis was studied in the four hybrids and in Macatawa. The latter was characterized by a high frequency of quadrivalent formation. In the pentaploids Loganberry x Macatawa and *R. ursinus* ($6x$) x Macatawa the frequency of formation of quadrivalents and trivalents was fairly high, but in the hybrids *R. ursinus* ($8x$) x Macatawa multivalent formation was reduced. It is suggested that the larger number of homologous sets in the latter hybrids favoured preferential pairing. The hybrids *R. ursinus* ($6x$) x Macatawa and *R. ursinus* ($8x$) x Macatawa showed meiotic irregularity. No evidence of relationship between meiotic disturbances and the oddness or evenness of the level of polyploidy could be detected. The chromosomes of all the different sets appeared to be sufficiently homologous for pairing in all combinations. It is therefore suggested that chromosome differentiation in *Rubus* has taken place mainly through gene mutations and minor structural changes.

1438 **Purple Autumn raspberry.**
Amer. Nurserym. 1953 : **98** : No. 7 : p. 65.

Purple Autumn, developed from a cross between Bristol and Indian summer at the Illinois Agricultural Experiment Station, has produced the longest fruits among the varieties recently tested at the Station. It matures its summer crop in early midseason and has a long harvesting period.

1439 Einset, J. & Pratt, C.
A blackberry-raspberry cross—a new fruit for the East?
Fm Res. 1953 : **19** : No. 4 : p. 3.

A cross between the Hailsham red raspberry and the Eldorado blackberry is reported. The hybrid is a tetraploid with $2n = 28$ and is highly fertile.

1440 **High-yielding blackberry is named by Experiment Station.**
N.J. Agric. 1953 : **35** : No. 5 : p. 14.

The new blackberry variety NJ 16 (cf. *PBA*, Vol. XXIII, Abst. 1460) has now been named Jerseyblack.

1441 Sergeeva, K. D.
(*Sphaerotheca* resistant, black-fruited forms of gooseberry).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1953 : No. 9 : 67–68. [Russian].

At Mičurinsk, productive, hardy and vigorous hybrids resistant to *Sphaerotheca* and bearing small black fruits of good quality were obtained by pollinating a hybrid between two unspecified wild gooseberries with a pollen mixture of Finik Zelenyĭ [Green Date] + Butyločnyĭ [Bottle] + Industrija [Industry]. Some hybrids produced almost no spines. The material is regarded as valuable for breeding large-fruited varieties with resistance to *Sphaerotheca*.

1442 Avkastningsförsök med krusbärssorter. **(Yield trials with varieties of gooseberries).**
Försök o. Forskn. 1953 : **10** : No. 1 : p. 6.
The full report on which this article is based was reviewed in *PBA*, Vol. XXIII, Abst. 2974.

1443 Stace-Smith, R., Wooley, P. H. & Vaughan, E. K.
A new disease of cultivated blueberry.
Phytopathology 1953 : **43** : p. 589.
A severe stem canker, caused by a species of *Pseudomonas*, has attacked blueberries in Western Oregon. The varieties Rubel, Pioneer and Burlington are seldom affected, and the *Vaccinium australe* x *V. lamarckii* hybrids Weymouth, June and Rancocas are highly resistant.

1444 Linden, R.
L'amélioration du fraisier par croisement dirigé. **(Strawberry breeding by means of controlled hybridization).**
Bull. Hort., Liège 1953 : **71** : 361–64.
A popular account of the breeding of new strawberry varieties by hybridization is given, together with details of the hybridization and selection technique employed.

1445 Šakselj, Ė. G.
(The strawberry).
Priroda (Nature) 1953 : No. 9 : 106–08. [Russian].
Descriptions of strawberry varieties bred in the USSR in recent years include data on the everbearing forms Ada, Neisčerpaemaja [Inexhaustible] and Sahalin, developed at the Principal Botanical Garden of the USSR Academy of Sciences. These varieties bear fruit for 90 days in Moscow and for 150 days in the southern provinces. The fruits weigh 15 g. each and a plant may bear as many as fifty inflorescences during a year, as well as developing runners which also bear fruits. Ada is the most productive and vigorous, but Neisčerpaemaja and Sahalin have a better flavour.

1446 Waldo, G. F.
Sources of red stele root disease resistance in breeding strawberries in Oregon.
Plant Dis. Reptr. 1953 : **37** : 236–42. (Mimeographed).
Approximately 75 selections considered to be resistant to red core have now been developed at the Oregon Agricultural Experiment Station from three sources of resistance: *Fragaria chiloensis*; *F. chiloensis* plus Aberdeen and the Scottish selection CC–18; or CC–18 and Aberdeen. Where breakdown in resistance has occurred, it has been due to the appearance of a new race. *F. chiloensis* has given highly vigorous progenies when crossed with standard varieties; this vigour has been maintained during further crossing and selection. In some moderately susceptible selections partly derived from *F. chiloensis*, portions of the root system not entirely killed produce new roots rapidly in spring, their growth equalling that of fully resistant selections, in fertile soil and with sufficient moisture. Many of the 75 selections yield berries with good average size, under favourable cultural conditions. Further crossing with larger-fruited selections and varieties is under way.

1447 Falch, J. & Strauss, E.
Sortenvergleiche und Leistungsprüfungen im Erdbeersortiment 1953. **(Variety comparisons and yield trials in the 1953 strawberry assortment).**
Mitt. höh. Bundeslehr- u. VersAnst. Wein-, Obst- u. Gartenbau Wien-Klosterneuburg, Bienenkunde Wien-Grinzing 1953 : **3** : 243–47.
The chemical composition and yields of 21 varieties are tabulated. Regina, Madame Moutot, George Soltwedel and Mieze Schindler were superior in yield and quality to other varieties tested.

1448 Fleming, H. K.
1952 strawberry variety trials in Erie County, Pennsylvania.
Progr. Rep. Pa agric. Exp. Sta. 1953 : No. 95 : unpaginated.
Data on a number of varieties are presented. Robinson, Kardinal King and Variety X produced more runners, greater yields and larger berries than other varieties tested. Their superior performance under adverse conditions suggests that these varieties are drought resistant.

1449 Gopalan Nair, T.
An inter-specific *Musa* hybrid produced at the Central Banana Research Station, Aduthurai.
Madras Agric. J. 1953 : **40** : 420–25.
The aim of breeding at the above station is the development of a wind-resistant dwarf form of the variety Monthan ($n = 22$); such a type would not entail reduction in yield since a higher density of planting is possible. A hybrid which should prove valuable in the synthesis

of a suitable male parent for breeding the desired form has been secured by crossing Monthan with the dwarf species *M. coccinea* ($2n = 20$).

1450 Baker, R. E. D. & Simmonds, N. W.
The genus *Ensete* in Africa.
Kew Bull. 1953 : No. 3 : 405–16.

A revision of African members of the genus *Ensete* is presented. The nature of the variation of *E. edule* is discussed and comments are given on the ecology, uses and history of the species.

1451 Marneffe, R. de & Delhaye, R.
Recherches sur l'hybridation, la culture et les parasites de la vigne. (**Investigations on hybridization, cultivation and parasites of the vine**).
IRSIA 1953 : No. 10 : 99–163.

This preliminary report of the work of the Belgian Committee for Scientific Research on Viticulture contains an account of crosses, carried out at the Provincial Experimental Station at Terhulpen in 1948, to obtain: (1) a vine like Gros Colman, but with dark berries; (2) a new variety like Muscat d'Alexandrie [Muscat of Alexandria], but later maturing; and (3) an improvement in the appearance of the bunches in Leopold III and Cannon Hall. Twelve out of the 990 hybrid seedlings that are being raised are listed, with brief comments. Other subjects treated in the report are: emasculation; pollen germination; artificial pollination; and the possible value of Cannon Hall as the pistillate parent in crossing to breed seedless grapes.

1452 'Izz ul Din Farraj
(**A new mutation in the Fayum grape**).
Mujall. Zira'. Misr. (J. Egypt. Agric.) 1952 : **30** : 332–39. [Arabic].

In 1950 a new bud mutation occurred in a Fayum grape in the research garden of the Faculty of Agriculture, Cairo. The berries on the mutant branch reached maturity earlier than the berries on the other branches. The mutant grapes were rounder and sweeter than in the typical variety.

1453 Giordano, B.
Uve pregiate Italiane. Olivella Vibonese.
(**Valuable Italian grapes. Olivella Vibonese**).
Ital. agric. 1953 : **90** : 742–46.

The variety described is cultivated in the district of Vibo in the province of Calabria; it is characterized by extremely sweet black grapes which mature late, travel well and could well compete with the Ohanes grapes of Almería.

1454 Barrett, H. C.
A large-scale method of inoculating grapes with the black rot organism.
Plant Dis. Reptr. 1953 : **37** : p. 159. (Mimeographed).

Details are given of the technique of mass-inoculating breeding material with *Guignardia bidwellii* by means of a De Vilbiss No. 15 atomizer or a small paint-spray gun (cf. *PBA*, Vol. XXIII, Abst. 2988).

1455 Jennings, J. P.
Grapevine anthracnose. Relative susceptibility of varieties.
J. Dep. Agric. S. Aust. 1953 : **57** : p. 23.

Grape varieties growing at the Nuriootpa Viticultural Station, South Australia, are classified with respect to their reaction to anthracnose (*Elsinoe ampelinum*).

FORESTRY

1456 Vorträge der Hochschulwoche Hann. Münden 1951. (**Lectures during the University Week, Hann. Münden, 1951**).
SchrReihe Forstl. Fak. Univ. Göttingen 1951 : **2** : Pp. 78.

An account of the proceedings of the forestry course held in 1951 by the Forestry Faculty of the University of Göttingen is given. The object of the course was to discuss practical problems arising in forestry management, and the best ways of improving forest economy. An article by T. Schmucker on the prospects of forest tree breeding is included. The best method of improving forest trees is the selection of a comparatively small number of élite mother trees, although as a result of their complicated genetical composition, these élite trees will not always give élite progeny. The increased use of seed nurseries is also advocated. Imported types of a particular tree may prove superior to local varieties. A combination of hybridization and polyploidy, followed by vegetative propagation, often gives good results.

1457 Heikinheimo, O.
Tähänastinen metsätutkimuksemme ja rodunjalostus. (**Forestry research and breeding up to the present time**).
Metsät. Aikakausl. 1950 : Nos. 7–8 : 1–2, 6.

A review is given of Finnish work on the importance of seed provenance of pine and spruce. Results of provenance tests with pine, spruce, larch, *Pinus murrayana* and Douglas fir are referred to briefly.

Among hybridization experiments reviewed are those concerned with heterotic larch hybrids and studies of various birch crosses, including some from curly birch. Juniper, birch and spruce have also been used to study the inheritance of particular morphological characters.

1458 SARVAS, R.
Kolme vuotta metsäpuiden rodunjalostustyötä Suomessa. (**Three years of forest tree breeding in Finland**).
Metsät. Aikakausl. 1950 : Nos. 7–8 : 3–6.

An account is given of the activities of the Forest Tree Breeding Foundation established in 1947, which works in conjunction with the Forestry Research Institute and the Government Forestry Bureau. The establishment of pure lines of plus trees selected in southern Finland, and propagated vegetatively at the Routsinkylä Experimental Station is to be followed shortly by the establishment of seed plantations.
Among hybridization experiments, the progeny of a cross between *Populus tremula* and *P. tremuloides* are important in that they can be grown under glass. Work with triploid poplars is also mentioned.

1459 HAGMAN, M.
Växtförädling inom skogsbruket. (**Plant breeding in forestry**).
Tidskr. Lantm., Helsinki 1953 : **35** : 148–50.

The application of genetics to sylviculture in Finland is exemplified, with special reference to various modern methods and the advantages consequent upon their use.

1460 **Research in forestry and forest products.**
FAO Forestry & Forest Products Study, Rome 1953 : No. 9 : Pp. 323.

This directory of institutions and projects dealing with research in forestry and forest products in member nations of FAO includes information on breeding and genetics.

1461 Statens skogsforskningsinstitut 1902–1952. (**The National Institute for Forest Research 1902-52**).
Medd. SkogsforsknInst. Stockh. 1953 : **42** : 1–322.

A full survey is provided of the establishment, functions and work of the Forest Research Institute of Sweden. In chapter VII, Å. Gustafsson describes past activities of the Genetics Division of the institute and outlines the present trend of research at the above institute and at the Ekebo Institute. Most of the papers listed in the accompanying extensive bibliography have been summarized from time to time in *Plant Breeding Abstracts.*
Problems concerning provenance are treated by O. Langlet in the same chapter.

1462 NÄSLUND, M.
Statens skogsforskningsinstitut, dess arbetsuppgifter och organisation. (**The Forest Research Institute of Sweden, its work and organization**).
Medd. SkogsforsknInst. Stockh. 1953 : **42** : No. 3A : 1–23. (also in English, No. 3B : 1–20; and German, No. 3C : 1–24).

An outline is given of the functions and organization of the above institute.

1463 WETTSTEIN, W.
Pfropfplantagen—"lebende Samenmagazine" des Forstpflanzenzüchters. (**Graft plantations—living seed stores for the forest tree breeder**).
Kärnter Bauer 1953 : **103** : 523–24.

An account is given of the principles of selection and hybridization in forestry, and a method described by which cuttings of commercially valuable trees may be grafted on to two-year old seedlings. In this way considerable reserves of seed-producing plants may be built up.

1464 SYRACH LARSEN, C.
Provenance testing and forest tree breeding.
FAO UN 1953 : Pp. 5. (Mimeographed).

Comments are made on the work of provenance testing carried out under the auspices of the International Union of Forest Research Organizations. The distinction between provenance testing and breeding is emphasized but the complementary continuation of the two methods of improvement is advocated.

1465 TUCKER, J. M.
The relationship between *Quercus dumosa* and *Qu. turbinella*.
Madroño, S. Francisco 1953 : **12** : 49–60.

In southern California, where these two species overlap, both forms have become modified through interbreeding.

1466 TUCKER, J. M.
Two new oak hybrids from California.
Madroño, S. Francisco 1953 : **12** : 119–27.

Natural hybrids between *Quercus* species are reported. *Q.* x *subconvexa*, a cross between *Q. durata* and *Q. garryana*, is the first authentic instance of spontaneous hybridization between a black oak (subgenus *Erythrobalanus*) and a white oak (subgenus *Lepidobalanus*). The hybrid is intermediate between the two parental

species in morphological characters, time of flowering and length of leaf persistence. *Q.* x *howellii* is a cross between *Q. garryana* and *Q. dumosa*. Morphological characters are intermediate between those of the parents. The haploid chromosome number was found to be 12. Both hybrids are highly sterile.

1467 VERESIN, M. M.
(An interesting oak tree).
Priroda (Nature) 1953 : No. 5 : 116–17. [Russian].

An oak tree found in the Vinnica province had some leaves resembling those of a willow. These had developed from winter buds, whilst buds formed in summer produced normal foliage. This phenomenon is attributed to atavism.

1468 PJATNICKIĬ, S. S.
(The winter oak and summer oak).
Priroda (Nature) 1953 : No. 10 : 97–102. [Russian].

A hardy late-flowering form of *Quercus robur*, a so-called winter oak, and two early flowering so-called summer oaks, one of which is drought resistant, are described, with notes on their external requirements and probable origins. The writer obtained some hybrids from crosses between winter and summer forms. The F_1 progeny were as early as, or earlier than, the early parent.

1469 MARQUARDT, H.
Über eine Methode zur züchterischen Bearbeitung von Standorteigenschaften bei der Pappel. **(On a method of utilizing differences in local adaptation in poplar breeding).**
Züchter 1953 : **23** : 365–70.

Poplar clones from a dry environment and clones from a humid environment were planted under identical conditions and their rate of transpiration compared. Under average conditions, the poplars from the dry environment transpired more and their rate of growth was slower than that of poplars from a humid environment. In periods of drought, however, the former were able to control their rate of transpiration more effectively, did not suffer so severely from prolonged shortage of water, and recovered more quickly from a period of drought than those clones taken from a humid environment.

When both types of clone were planted under dry conditions, the clones from a dry environment thrived, whilst those from a humid environment became stunted and deformed.

Drought resistance in poplars is thus a genetically determined characteristic. The aim in breeding should be to develop strains best suited to any one particular locality, using extensive crosses to take advantage of the heterosis effect. The resulting trees would then be propagated vegetatively. In addition to drought resistance, further aims in poplar breeding are improvement in rate of growth, quality of wood and resistance to pests.

1470 "Poppelrosten." **(Poplar rust).**
Fruktodlaren 1953 : No. 5 : 125–26.

Populus berolinensis is subject to a form of scab caused by *Venturia* sp. and wrongly termed poplar rust. *P. robusta* is resistant and, according to a Swedish fruit grower, E. Orelind, has proved successful as a stock for *P. berolinensis*.

1471 VAN STEENIS, C. G. G. J.
Results of the Archbold expeditions. Papuan *Nothofagus*.
J. Arnold Arbor. 1953 : **34** : 301–74.

The past and present world distribution of *Nothofagus* and the evolution of the genus, interpreted on the basis of the morphology of the inflorescences, are discussed. The variation and diagnostic value of different characters are examined, and genetic differences between *Fagus* and *Nothofagus* listed. A detailed classification of the Papuan species of *Nothofagus* is presented. A classification key for the extra-Papuan members of the genus is also provided.

1472 WETTSTEIN, W.
Auslese bei Birkennachkommenschaften. **(Selection of birch progenies).**
Holzforschung 1951 : **5** : 106–08.

Observations are reported on the branching habit, flushing time and frost resistance of Austrian and Swedish samples of birch grown in a comparative trial at Mariabrunn, Austria. The variation observed in these characters provides an adequate basis for selection.

1473 MCVEAN, D. N.
Regional variation of *Alnus glutinosa* (L.) Gaertn. in Britain.
Watsonia 1953 : **3** : 26–32.

A study of 18 populations in Britain has provided evidence of clinal variation in leaf and catkin size and in photoperiodic response, this variation tending to correspond to the main climatic gradient from southeast to northwest. The lower degree of morphological variability in the northern populations indicates that some gene elimination has occurred. The failure to establish similar morphological gradients altitudinally strengthens the view that the variation described is genotypic. The morphological gradients are expressed as alterations in the

mean values of the ranges of leaf and catkin size rather than as a polymorph-ratio cline involving the three varieties *macrocarpa*, *typica* and *microcarpa*, all of which have the diploid number of $2n = 28$. Habit preferences favour the formation of isolated local colonies which tend to intrabreed rather than interbreed.

1474 LANGLET, O.
"Kontinent-"igen. (**"Continent" again**).
Skogen 1953 : **40** : p. 258.

Reviewing the discussion on Kiellander's proposed designation "continent spruce" for the central European spruce (cf. Abst. 670), the writer again stresses, as his main reason for rejecting the suggestion (cf. *PBA*, Vol. XXIII, Abst. 3010), his belief that the introduction of a word with such a wide meaning will not make for precision in indicating provenance.

1475 MIYAJIMA, H.
(On the relation between the rooting capacity of cuttings of *Cryptomeria japonica* and variety).
Kyushu Daigaku Nogakubu Gakugei Zasshi/Sci. Bull. Fac. Agric. Kyushu Univ. 1951 : **13** : 277–81. [Japanese].

A wide range in rooting capacity was noted in a comparative investigation of five races. Roots were formed most readily in the race Ayasugi.

1476 GRIFFITH, A. L.
Hybridization in the cypresses in East Africa.
Emp. For. Rev. 1953 : **32** : p. 363.

Hybridization within the complex *Cupressus lusitanica* is causing impurity of locally collected seed. In progeny trials at Elburgon, Kenya, seedlings from a single tree have differed in cotyledon number. At the time of planting out, 4-cotyledonous seedlings were 11% shorter than 2-cotyledonous seedlings, but a year later were 11% superior in height. It remains to be seen whether this advantage is maintained.

1477 HARM, H.
Erkenntnisse und neue Wege zur Steigerung der Harzerträge. (**Recent findings and ways of increasing resin yields**).
Allg. Forstztg. 1953 : **64** : 243–49.

The resin-producing capacity of pines is dependent upon two genetically determined factors, namely the number of epithelial cells and the suction pressure of the epithelial cells when exuding the resin.
The first factor may be calculated by measuring the total surface area of the resin ducts; the second by comparing the amount of resin exuded by two trees with the same area of visible resin ducts.
It is estimated that propagation of parent trees with high resin yield would double the average amount of resin produced per tree.

VEGETABLES

1478 ÅVALL, H.
Sortförsök med köksväxter. (**Variety trials with vegetables**).
Forsök o. Forskn. 1952 : **9** : 55–56.

The results of the above trials have already been summarized in *PBA*, Vol. XXIII, Abst. 3016.

1479 LARSSON, G.
Sortförsök med köksväxter i Norrland. Sockerärter, rödbetor och vitkål 1949–1951. **(Variety trials with vegetables in Norrland. Sugar peas, garden beets and white cabbage, 1949-51).**
Försök o. Forskn. 1953 : **10** : No. 1 : p. 8.

The full account of these trials has already been reviewed in *PBA*, Vol. XXIII, Abst. 3017.

1480 Jaarverslag 1950. (**Annual Report, 1950**).
Inst. Vered. TuinbGewass. 1951 : Pp. 194.

Raspberry. The hybrids Milton 1 x (Newburgh x Milton 1) and Milton 1 x Viking proved resistant to the virus vector *Amphorophora rubi*.
Strawberry. Madame Lefeber, Oranje [Orange], Chey 3, *Fragaria virginiana* and *F. chiloensis* were tolerant of virus infection.
Deutsch Evern [German Evern] has proved less susceptible to *Verticillium* than other varieties cultivated in the Netherlands.
The results of hybridization to obtain earlier varieties and strains with greater resistance to virus attack, *Verticillium* and frost are given.
Radish. The new variety Cherry Belle was compared with eight commercial varieties and shown to have least tendency to become spongy.
Asparagus. Varieties recommended for cultivation in the Netherlands are listed. Experiments to breed exclusively male populations are described.
Cabbage. Experiments to determine the extent of natural hybridization between *Brassica oleracea* and *B. napus* are reported.
Cauliflower. Emphasis is being placed on the breeding of varieties resistant to heat and drought.
Failure to form a heart was shown not to be a genetically determined characteristic.
The results of experimental crossings between broccoli and cauliflower are given.

Spinach. Lines have been bred possessing resistance to *Peronospora spinaciae*, and these will be crossed with commercial varieties.

Endive. Investigations into flower colour showed blue to be due to two dominant factors. White and pink are each caused by one dominant and one recessive factor. The cross pink x white gives blue flowers in the F_1 generation. Experiments have shown inbreeding to be possible without the danger of degeneration.

Tomato. Importance is being attached to the breeding of very early varieties. Hybrids involving Farthest North have flowered in December and January.

Particulars of breeding for resistance to *Cladosporium fulvum* are given.

1481 **(The present state of vegetable breeding in Japan).**
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **2** : p. 74. [Japanese].

A brief outline is given of the history, organization and breeding projects concerned with the improvement of vegetables in Japan.

1482 Istinu, K. R.
(Genetics in vegetable breeding).
'Ulum Zira'. (Agric. Sci.), Cairo 1948 : **1** : 169–97. [Arabic].

A review is given of the various ways in which genetics may be applied to the improvement of vegetables.

1483 **Report of the Minister of Agriculture, Ontario Department of Agriculture, Province of Ontario for the year ending March 31st, 1953** : Pp. 191.

Horticultural Experiment Station

The vegetable breeding work includes the following: sweet potato, testing of varieties and breeding for adaptability to Ontario conditions; radish, for early and even maturity in greenhouse culture; cucumber, for resistance to bacterial wilt; tomato, greenhouse varieties resistant to leaf mould, earliness and productivity in outdoor processing varieties, the use of F_1 hybrid seed to increase yield, and breeding for high ascorbic acid content.

Genetical studies of sweet cherry are being made on the F_1 of crosses using Hedelfingen as the one parent and Black Tartarian or Bing as the other. The genetics of the resistance of tomato varieties to leaf mould was also studied.

Western Ontario Agricultural School and Experiment Farm

Beaver and Alaska among the oats, Clipper and Michelite among the field beans, and Adams, Hawkeye and Harosay among the soya beans gave the highest yields in variety trials.

1484 Odland, M. L. & Noll, C. J.
Vegetable variety trials—1952.
Progr. Rep. Pa agric. Exp. Sta. 1953 : No. 92 : unpaginated.

Sweet pepper. Of varieties in commercial use Penn Wonder was given the highest rating, based on shape, yield and quality.

Cabbage. Green Acre 50445 and Early Glory 90533 gave the highest yields.

Summer squash. The varieties Yankee hybrid 1046 and Early Yellow Prolific 1045 yielded the highest number of marketable fruits. Mammoth White Bush Scallop 1043 and 521/04 gave the highest yield in weight.

Tomato. Stokecross 2 was superior in respect of yield and quality of fruit, and was relatively free from leaf disease.

Egg plant. The heaviest yields were attained by new F_1 hybrids.

Snap beans. Top Cross 1112 and 19 gave the highest yields.

Lima beans. No. 11 Fordhook 242 and Bixby 1303 proved superior in yield.

Sweet corn. Detailed data on quality, length of growing period and resistance to disease and insect pests are presented for 70 varieties and experimental hybrids.

1485 Kennerly, A. B.
Better vegetables are on the way.
Sth. Seedsman 1953 : **16** : No. 11 : 47–48.

A popular account of breeding work at various Texas research stations is given. Especially encouraging progress in breeding new varieties of tomato is reported; Step 193 has given the highest yields in variety trials. A new melon, 51–27, developed by the Regional Vegetable Breeding Laboratory at Charleston, SC, yields well and is resistant to wilt and to the pimpling disease, thought to be caused by a ring spot virus.

1486 Tokumasu, S.
(Male sterility in the radish).
Kyushu Daigaku Nogakubu Gakugei Zasshi/Sci. Bull. Fac. Agric. Kyushu Univ. 1951 : **13** : 83–89. [Japanese].

Three male-sterile plants have been discovered in the Japanese radish variety Tokinashi. Microsporogenesis proceeds regularly till diakinesis, after which the mother cells degenerate. This condition is governed by a single recessive gene, denoted by *ms*.

1487 Tabin, S.
Możliwości uprawy bulwy (*Helianthus tuberosus*) w Polsce. [**The possibilities of cultivating the Jerusalem artichoke (*H. tuberosus*) in Poland**].
Ann. Univ. M. Curie-Skłodowska 1952 : **7** : 173–261.

In these experiments a white-tubered variety was found to have a thicker stem and to give a higher yield of green matter than another variety with yellowish tubers; the latter variety, however, has a longer and broader leaf, flowers earlier and shows a higher percentage of dry matter from the tuber sap than the white-tubered variety.

1488 Ščerbakov, G. S.
(An experiment by leading seed growers on the onion Balakleja).
Selekcija i Semenovodstvo (Breeding & Seed-growing) 1953 : No. **5** : 67–68. [Russian].

At Harjkov, the yield and keeping properties of the land variety Balakleja have been improved by selection. The improved variety is morphologically more uniform than the initial population.

1489 **Onion breeders release new line.**
Iowa Fm Sci. 1953 : **8** : No. 5 : p. 9.

The inbred B 2215 is being jointly released by the US Department of Agriculture, and the Iowa and Idaho Agricultural Experiment Stations. It should prove valuable in the development of high-yielding hybrids with good storage quality, and suitable for cultivation on muck soils.

1490 **Two new early onion varieties.**
Seed World 1953 : **73** : No. 5 : p. 44.

Two new pink-root resistant varieties, L 36 and L 365, have been developed cooperatively by the US Department of Agriculture and the Texas Agricultural Experiment Station. L 36, containing in its pedigree Yellow Bermuda, White Persian and Excel, resembles Yellow Bermuda but matures earlier and stores better. L 365, whose pedigree involves Crystal Wax and Excel, is similar in type to Crystal Wax; it has consistently outyielded L 690, the standard early-maturing variety in Texas.

1491 Kinpyo, T., Ohara, T. & Kohayakawa, T.
Applied and comparative biochemical studies on the *Allieae*. I, II, III).
Shizuoka Daigaku Nogakubu Kenkyu Hokoku/Rep. Fac. Agric. Shizuoka Univ. 1952 : No. 2 : 170–210. [Japanese].

Japanese varieties of *Allium fistulosum*, *A. cepa* and *A. odorum* are compared in respect of their content of sugars, fibre, ethereal extract, ash, and total C, N and S.

1492 Cicin, N. V.
(The wild flora must be made to serve the national economy).
Priroda (Nature) 1953 : No. 7 : 25–32. [Russian].

Mention is made of certain wild plants in the USSR which may prove valuable for breeding purposes. These include the Pskemskiĭ and Korotovskiĭ onions, introduced into Moscow from the Tien Shan.

1493 Gilbert, J. C.
Improved hot weather cauliflower types.
Circ. Hawaii Agric. Exp. Sta. 1953 : No. 40 : Pp. 7.

An account is given of the selection by the Hawaii Agricultural Experiment Station of strains adapted to hot weather conditions. The variety Pau Kea, a selection from an Indian cauliflower, yields well and produces a good quality curd even at high temperatures.

1494 Bemis, W. P. & Wilson, G. B.
A new hypothesis explaining the genetics of sex determination in *Spinacia oleracea* L.
J. Hered. 1953 : **44** : 91–95.

In experiments at Michigan State College, expression of sex type was not influenced by environmental factors, nor was it associated with caryotypical differences. An attempt has therefore been made to explain the following observations by a genetical hypothesis: the general maintenance of a 1 : 1 ratio of male : female plants; and the occurrence of intersex types, either pure breeding, or segregating into (1) males, females and intersexes, (2) females and intersexes only, or (3) males and intersexes only. It is postulated that, in addition to the usual X/Y mechanism for sex determination, two closely linked autosomal pairs of genes are also involved, *Aa* and *Gg*, influencing the expression of maleness and femaleness, respectively. As long as the genetic potentials are balanced, segregation into ♂ and ♀ plants occurs. Occasional crossing-over in the heterozygote *AG/ag*, however, results in different types of intersex, either true breeding or segregating. Thus the genotype X/X, *Ag/Ag* would be a true-breeding intersex, and a genotype such as X/Y, *aG/ag* would segregate, upon selfing, into females, intersexes, male intersexes and males. This hypothesis differs only in minor details from that proposed by

Sugimoto, but is regarded as having the advantage of the ability to explain the presence of different types of intersex on a genetic rather than an environmental basis.

1495 WHITAKER, T. W. & BOHN, G. W.
Contributions of applied science to the lettuce industry of the southwest.
Econ. Bot. 1953 : **7** : 243–56.

A section is included on the achievements of lettuce breeding in the southwestern United States.

1496 GODFREY, G. H.
New gold from the Rio Grande.
Sth. Seedsman 1953 : **16** : No. 12 : 21, 87–88.

Rio-gold, a new high-yielding, disease-resistant cantaloupe, selected from a cross between Hales Best and a wild melon with high resistance to downy mildew, and outcrossed with Smith's Perfect, is described. The flesh is sweet and tender, deep to very deep, with a small dry seed cavity. The appearance and rind colour are attractive and the plant is resistant to both downy and powdery mildew, and to attack by aphids.

1497 MANN, L. K.
Honey bee activity in relation to pollination and fruit set in the cantaloupe (*Cucumis melo*).
Amer. J. Bot. 1953 : **40** : 545–53.

In investigations on the variety Powdery Mildew Resistant Cantaloupe 45, hand pollinations, usually with pollen from staminate flowers from the same plant, gave lower fruit sets than open pollinations. Open-pollinated flowers also produced larger fruits and more seeds than hand-pollinated flowers. Experiments were carried out on the frequency and duration of the visits of honey bees, the chief pollinating insects under conditions of open pollination. Each flower was visited repeatedly during the one day it remained open; on the average perfect and staminate flowers were visited 53 and 42 times, respectively. Preference for perfect flowers may have been due to their larger corollas. Individual perfect and staminate flowers produced about equal quantities of pollen, viz. 8000–13,000 grains; during the day the bees removed all but 2000, pollen collection being most rapid during the morning hours. Injured open-pollinated flowers set less fruit than uninjured open-pollinated flowers, suggesting that injury is one factor involved in the decrease of fruit set from hand pollinations; but the fact that injured open-pollinated flowers set more fruit than hand-pollinated flowers indicates that injury is not the only factor concerned. Repeated hand pollination gave little evidence of being more effective than a single pollination. In hand pollination experiments comparing the results of cross and self pollination, the two methods did not differ significantly in the percentage fruit sets obtained.

1498 JOHNSTONE, F. E. (JUN.)
The customers came back for more.
Sth. Seedsman 1953 : **16** : No. 12 : 37, 87.

The Japanese Seedless water melon, which originated in Japan, is now being grown in Georgia. It is produced by maintaining two separate lines, one an ordinary type and the other a colchicine-induced tetraploid of the same variety. These two lines are crossed each season, the triploid F_1 hybrid producing almost completely seedless fruit (cf. *PBA*, Vol. XXI, Abst. 1413).

1499 ANDRUS, C. F.
The Fairfax watermelon.
Sth. Seedsman 1953 : **16** : No. 11 : 30, 59, 67.

Full particulars of the wilt and anthracnose resistant water melon Fairfax are given (cf. *PBA*, Vol. XXIII, Abst. 3055).

1500 HAYASE, H.
(Studies on cucurbit crosses. IV. The influence of the number of pollinated stigmas on the development of cucurbit fruits).
Hokkaido Nogyo Shiken Jo Iho/Res. Bull. Hokkaido Nat. Agric. Exp. Sta. 1953 : No. 64 : 22–25. [Japanese].

Fruit setting in *Cucurbita maxima* increased with the number of stigmas pollinated; selfing produced fewer seeds than sib-crossing. The number of seeds in each locule was approximately equal, even when only one stigma was pollinated, indicating ready lateral movement of the pollen tubes.

1501 HAYASE, H.
(A simple method of evaluating quality in edible cucurbits).
Hokkaido Nogyo Shiken Jo Iho/Res. Bull. Hokkaido Nat. Agric. Exp. Sta. 1953 : No. 64 : 93–99. [Japanese].

Quality is closely correlated with dry matter content and the refractometer reading of the juice. In breeding work, refractometer readings provide the simplest and most reliable way of estimating quality.

1502 GOGIBERIDZE, A. A. & FOGELJ, A. N.
(The cultivation of *Sechium edule*).
Priroda (Nature) 1953 : No. 11 : 110–11. [Russian].

An early and productive form with large fruits of good quality has been selected at Suhumi.

1503 BARNES, W. C. & EPPS, W. M.
Two types of anthracnose resistance in cucumbers.
Plant Dis. Reptr. 1952 : **36** : 479–80. (Mimeographed).

Two distinct types of resistance to anthracnose, differing in both degree of resistance and mode of inheritance, were found in South Carolina. In the more resistant type, resistance appears to be governed by several genes, probably independently inherited. The second type of resistance is attributed to a single dominant factor.

1504 PIERSON, C. F.
The relation of *Cladosporium cucumerinum* to resistant and susceptible cucumber tissues.
Phytopathology 1953 : **43** : 481–82. (Abst.).

In both resistant and susceptible hosts, *C. cucumerinum* is initially intercellular. In susceptible tissues the fungus becomes intracellular 96 hours after inoculation. In resistant tissues it seldom shows an intracellular habit, the disease being arrested by host reactions associated with cell-wall thickening and necrosis.

1505 SCHULTZ, J. H.
New tomato varieties for North Dakota.
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1953 : **15** : 114–17.

The varieties Cavalier and Doublerich, already mentioned in *PBA*, Vol. XXII, Abst. 2554 and Vol. XXIII, Abst. 1809 respectively, are described.

1506 LITYŃSKI, M. & ADAMCZYK, Z.
Studia nad krzyżówkami generatywnymi pomidorów. **(Studies on generative crosses of tomatoes).**
Roczn. Nauk rol. 1952 : Ser. A : **66** : No. 1 : 154–56.

The varieties Mory 33, Mory 25, Rekord J., Open Air, Rakowickie and Cukrowe Drobnoowocowe [Sweet Small-fruited] were used in studying the F_2 of 13 crosses, only a few of which are specified.

High content of dry matter in the fruit was satisfactorily transmitted by Cukrowe Drobnoowocowe, but its hybrids have some unwanted primitive features.

Heterotic increases in yield of fresh and dry matter, fruit size and plant height were observed in crosses with Rakowickie. This variety and its hybrids gave the best yields; it also showed a high value for dry matter, but the highest value for this characteristic was obtained from the cross Rakowickie x Mory 25.

1507 DENNETT, R. K. & LARSON, R. E.
Inheritance of fruit shape, locule number and stem color in derivatives of a hybrid of *Lycopersicon esculentum* and *Lycopersicon peruvianum*.
Bull. Pa agric. Exp. Sta. 1953 : No. 563 : Pp. 29.

The results of these investigations have already been summarized (cf. Abst. 723).

1508 **New Century tomato gets new Jersey certification.**
Sth. Seedsman 1953 : **16** : No. 12 : p. 93.

Century, a new early tomato variety selected from a cross between Valiant and an English variety, is described. It is resistant to wilt, and the fruit is oval, firm and free from cracking.

1509 YAMADA, S.
(A new tomato disease caused by *Cercospora*).
Nihon Shokubutsu Byorigaku Kai Ho/ Ann. Phytopath. Soc. Japan 1951 : **15** : 61–66. [Japanese].

A fungus, identified in a postscript as *C. fuligena*, is responsible for considerable damage to the tomato in Japan. Varietal reactions have not yet been fully investigated, but Dwarf Stone and Marglobe appear to be resistant.

1510 ANDEWEG, J. M.
Enkele grepen uit de tomatenveredeling. **(A few ideas on tomato breeding).**
Versl. StudKring. PlantVeredel., Wageningen 1952 : 474–80. (Mimeographed).

The history of the tomato, and the various trends in breeding in different countries, were discussed. Aims still to be attained are increased resistance to disease and the breeding of varieties which mature earlier.

The practical value of grafting commercial varieties on to rootstocks resistant to *Verticillium* and eelworm, and the advantages of F_1 hybrid seed, both from the point of view of increased yield and the breeder being enabled to keep his process secret, were among the topics debated.

1511 GILBERT, J. C. & MCGUIRE, D. C.
New tomatoes are gall-resistant.
Hawaii Fm. Sci. 1953 : **1** : No. 4 : 2, 6.

New gall-resistant varieties of tomato have

been developed at the Hawaii Experiment Station by incorporating genes for resistance to root-knot nematodes, derived from *Lycopersicon peruvianum*, into commercial varieties. The new varieties produce fruit of good commercial quality, and are resistant to the species of root knot nematode most common in Hawaii and the southern USA.

1512 Gotoh [Goto], K.
Genetic studies on eggplant (*Solanum melongena* L.). II. The heritability of some quantitative characters and estimation of minimum number of genes.
Genetica 1953 : **26** : 453–67.

By means of five crosses involving six varieties, estimations were made of the heritability of seven quantitative characters and the minimum number of genes conditioning five of them. Fruit shape, fruit weight, duration of the period between sowing and flowering, and fruit yield and number per plant showed an average heritability of 89·27, 88·83, 69·62, 10·02 and 4·05%, respectively. The minimum numbers of genes governing shape, weight, and the period from sowing to flowering were calculated as 5, 9 and 4, respectively.
Number of flowers per bunch per plant and leaf hairiness had a heritability of 80 and 70·48%, respectively, in the one cross studied with respect to these characters; the minimum number of genes concerned was found to be 3 and 4, respectively. Data on phenotypic correlations suggested that the genes controlling shape, weight, number of flowers per bunch, hairiness and period from sowing to flowering were segregating independently. Pigmentation of the anther and lower part of the calyx was due to the pleiotropic effect of a major gene.
In one cross, Florida High Bush x Sendai-nana 1, this pigmentation was associated with large, oblate fruits and with later maturity.

1513 Gotoh [Goto], K.
Genetic studies on egg plant (*Solanum melongena* L.). I. Regression analysis of quantitative gene action.
Genetica 1953 : **26** : 445–52.

Using Griffing's method of analysis by constant parent regression (cf. *PBA*, Vol. XX, Abst. 2024), the genetics of several characters was studied in given varieties and their F_1 hybrids. Genes for fruit shape (length/width) and those for the duration of the period from sowing to date of appearance of the first flower possessed an automatically cumulative action with negative dominance, which was slight for fruit shape and highly variable in degree in the case of the second character. Genes for fruit weight were characterized by a logarithmically cumulative action, with or without dominance. Number of flowers per bunch per plant showed no dominance relationships; genes for leaf hairiness generally exhibited negative dominance.

1514 Fukuda, J.
(Studies on the ecology and control of *Chlorita biguttula* Ishida. I. On the resistance of the egg plant to *C. biguttula*).
Tokai Kinki Nogyo Shikenjo Engeibu Kenkyu Hokoku/Bull. Hort. Div. Tokai-Kinki Agric. Exp. Sta. 1952 : No. 1 : 159–205. [Japanese].

In a comparative investigation of varieties grown in Taiwan, Japanese varieties were highly susceptible, in contrast to the resistance of such varieties as Malayan 12 and Indomarunasu [Indian Round egg-plant]. Resistance appeared to be correlated with the thickness of the collenchyma which the larvae have to penetrate in order to oviposit and extract sap from the underlying parenchyma.

1515 Åkerberg, E.
Baljväxterna i världens jordbruk. **(Legumes in world agriculture).**
Försök o. Forskn. 1953 : **10** : 73–74.

This article has been specially contributed in order to draw the attention of Swedish agriculturists and economists to the survey of the above subject by R. O. Whyte, G. Nilsson-Leissner and H. C. Trumble (cf. *PBA*, Vol. XXIII, p. 665).

1516 Mastenbroek, C.
Veredeling van landbouwstambonen op resistentie tegen de vetvlekkenziekte. **(Breeding field crop kidney beans for resistance to grease spot).**
Versl. StudKring. PlantVeredel., Wageningen 1953 : 496–503. (Mimeographed).

Walcherse witte [Walcheren White], Red Mexican UI 3 and UI 34, Michelite, Robust and Great Northern are immune to *Pseudomonas medicaginis* var. *phaseolicola* but mature too late for Netherlands conditions. Attempts were made to cross these resistant varieties with susceptible native strains. Best results have been obtained from the backcross (Ceka x Red Mexican UI 34) x Ceka. This hybrid is resistant to grease spot, but its yield is below that of Ceka.
Indications are that the factor for resistance in Red Mexican VI 34 is dominant and that

resistance in the other varieties is inherited as a recessive character.

1517 Babamov, L.
(A basis for the standardization of rainfed varieties of field bean).
Zborn. Zemjod.- Ispit. Inst. Skopje/Ann. Agric. Res. Inst. Skopje 1952 : **1** : 227–229. [Macedonian].

In Macedonia, the Bulgarian *Phaseolus* varieties 338, 1028 and Čirpan 12 have proved more productive and shown a higher degree of resistance to halo blight and other diseases than the best local varieties.

1518 Mujica R., F.
Razas fisiológicas y susceptibilidad varietal de los frejoles chilenos a la antracnosis. **(Physiological races and varietal susceptibility to anthracnose of the Chilean forms of *Phaseolus*).**
Agricultura téc., Santiago 1952 : **12** : 37–45.

The reaction to three Chilean strains of *Colletotrichum lindemuthianum* was studied in 25 bean varieties, including the main commercial varieties grown in Chile and also a number of introduced varieties. The differences between the three strains of the fungus were so slight that they were regarded as all belonging to one main physiological race, the properties of which were distinct from those described for other countries. The only varieties that proved immune in all tests were Arroz [Rice] and Cristal [Crystal] among the Chilean beans and Red Kidney and Michelite among the imported types.

1519 **Jackson soybean may lower cost for growers in Southeast.**
Seed World 1953 : **73** : No. 2 : 22, 39.

The new soya-bean variety Jackson possesses high yielding ability, resistance to lodging, good seed quality and high content of oil. It is widely adapted in the southeastern United States, and was developed by crossing Volstate and Palmetto and then backcrossing to the former parent.

1520 Šulyndin, A. F.
(Improving nitrogen fixing capacity of the soya bean by breeding varieties highly receptive to nodular bacteria).
Mikrobiologija (Microbiology), Moskva 1953 : **22** : 288–93. [Russian].

In Ukrainian experiments, receptivity of some varieties to nitrogen-fixing bacteria was improved by intravarietal selection under conditions of artificial infection. Material so selected for one or more generations had a higher sugar content than the initial plants.

1521 Ozaki, K.
(Studies on the response to warmth and illumination of soya beans. I. On the response to warmth and illumination and geographical distribution of soya bean varieties in Hokkaido).
Hokkaido Nogyo Shiken Jo Iho/Res. Bull. Hokkaido Nat. Agric. Exp. Sta. 1953 : No. 64 : 7–11. [Japanese].

A series of 44 Japanese varieties were differentiated according to their flowering periods under (1) natural conditions, (2) high temperature, and (3) high temperature and short photoperiods. In northern and eastern Hokkaido, the varieties are of the summer type; in the central districts, summer types preponderate; while towards the south, summer, intermediate and autumn types are found.

1522 Kawahara, E. & Maruko, Y.
(Studies on leaf fall in the soya bean. II. The geographical distribution and characteristics of the varieties whose leaves do not fall).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 109–12. [Japanese].

Out of 265 varieties investigated, 6, all from the USA, retained their leaves in autumn. Only one of these varieties, Chestnut, was early-maturing. All 6 varieties had little or no starch in the seed and pulvinus; the seeds weighed less than average, and the testa and hilum were dark in colour.

1523 Probst, A. H.
Perry soybeans for Indiana.
Sta. Circ. Purdue Agric. Exp. Sta. 1953 : No. 398 : Pp. 11.

Further particulars of the new soya bean variety Perry (cf. *PBA*, Vol. XXII, Absts. 3075 and 3079) are given. It has shown considerable resistance to lodging and is best suited for cultivation in the southern midwest of the USA.

1524 **Soybean varieties. Descriptions and synonyms, including names of obsolete or old and seldom grown varieties.**
U.S. Dep. Agric. 1953 : Pp. 30. (Mimeographed).

Morphological and agronomic data are presented for soya bean varieties cultivated in the USA. The synonyms of variety names, a list of obsolete and rarely grown varieties, and a map showing areas of maturity are also given.

1525 INOUYE [INOUE], C.
(Cytological studies on the root nodules of the soya bean).
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1951 : **20** : 97–99. [Japanese].
The formation of bacterial nodules in the soya bean is accompanied by amitotic nuclear division, a description of which is given.

1526 CHAMBERLAIN, D. W.
Disease reaction in relation to inoculum dilution in bacterial blight of soybean.
Phytopathology 1953 : **43** : p. 468. (Abst.).
The relationship between dilution of inoculum and disease resistance was studied under greenhouse conditions, using *Pseudomonas glycinea* as the test organism. The concentration of bacteria and the number of typical lesions induced on resistant and susceptible plants were directly related. The most pronounced differentiation between resistant and susceptible varieties was secured with concentrations between 800,000 and 80,000 cells per ml. of sterile water. Under field conditions, differentiation between susceptible and resistant varieties was possible with a concentration of 8,000,000 cells but this concentration occasionally produced too severe a reaction in greenhouse-grown varieties of proved field resistance.

1527 SILVA, J. G. DA, LORDELLO, L. G. E. & MIYASAKA, S.
Observações sôbre a resistência de algumas variedades de soja ao nematóide das galhas. **(Observations on the resistance of some soya bean varieties to root-knot nematode).**
Bragantia 1952 : **12** : 59–63.
Twenty-one varieties were tested in soils heavily infested with two forms of *Meloidogyne*, both closely related to *M. incognita*. Several varieties proved resistant, including La 41–1219, which has been reported resistant in the southern USA. Conversely N 46–2652 proved susceptible, though in the southern USA it is resistant.

1528 ARRUDA, H. V. DE
Análise de uma experiência sôbre variedades de soja. **(Analysis of an experiment on soya bean varieties).**
Bragantia 1952 : **12** : 65–73.
In an experiment to test the reaction of 22 soya bean varieties to the root-knot nematode (cf. Abst. 1527), the variation of the control variety, Abura, which is susceptible, was allowed for by the use of the analysis of covariance, thus reducing the experimental error by 13%.

1529 DULUCQ, T. & LASCOMBES, S.
Action du thorium X sur les cellules méristématiques. Sa localisation par autohistoradiogrammes. **(Action of thorium X on meristematic cells. Its localization by autohistological radiograms).**
Bull. Soc. Bot. Fr. 1953 : **100** : 191–95.
Mitotic abnormalities induced in meristematic cells in seeds of *Pisum sativum* after treatment with thorium X included (*a*) a reduction in the number of mitoses, which may, however, be normal; and (*b*) stickiness and abnormal chromosome distribution to the poles.

1530 MELETTI, P.
Reazioni cito-istologiche ed effetti rizogeni in plantule di alcune leguminose trattate con 2,4-D. **(Cytohistological reactions and rhizogenic effects in seedlings of some Leguminosae treated with 2,4-D).**
Nuovo G. bot. ital. 1950 : **57** : 499–514.
The presence of polyploid cells in differentiated tissues of seedlings of the pea and broad bean was demonstrated by inducing mitosis in these tissues by means of dilute solutions of 2,4-D.

1531 SCHMIDT, H-H.
Die Keimung überlagerter Erbsensorten. **(Germination of stored pea varieties).**
Saatgutwirtschaft 1953 : **5** : 279–82.
The germination percentages of nine American varieties kept in storage for 3 to 4 years were studied. Greenfeast and Improved Surprise gave the most viable seed under these conditions.

1532 KNOBLAUCH, F.
Sortsforsøg med lave marværter 1950–52. **(Variety trials of dwarf marrowfat peas, 1950-52).**
Tidsskr. Planteavl 1953 : **56** : 613–32.
The characteistics, origin and performance are recorded of varieties received from Danish and Swedish seed firms for entry in the official trials in Denmark at the Virum, Blangstedgaard, Spangsbjerg and Hornum experimental stations. Freezing tests were also conducted at Hornum. Safir [Sapphire], Balder, Imperial, Continental and Beta proved the highest yielding, while the variety Wiwo was noted for its earliness and high quality of seeds.
Owing to a change in the nomenclature adopted in the final classing of varieties and strains in

trials carried out under the Danish Plant Cultivation Service, an S followed by the year replaces the Roman figures formerly used.

1533 Abdul Hafiz & Muhammad Ashraf
Studies on the inheritance of resistance to *Mycosphaerella* blight in gram.
Phytopathology 1953 : **43** : 580–81.

Crosses between susceptible Punjab varieties and the resistant French varieties F8 and F10 showed resistance of *Cicer arietinum* to *Mycosphaerella* blight to be a dominant character. Segregation in the F_2 was in a 3 : 1 ratio, indicating that resistance is controlled by a single pair of factors.

1534 Deshpande, R. B. & Jeswani, L. M.
A prostrate mutant in pigeon-pea [*Cajanus cajan* (L.) Millsp.]—a possible soil conservation plant.
Indian J. Genet. 1952 : **12** : 50–51.

A prostrate mutant of the pigeon pea, of possible value as a soil conservation plant, was observed at the New Dehli Agricultural Research Institute in 1950. The mutant breeds true to type.

BOOK REVIEWS

Finney, D. J.
An introduction to statistical science in agriculture.
Oliver & Boyd, Edinburgh and London 1953 : 25s. : Pp. 179 : figs. : tables.

The experience of the reviewer is that it is impossible to be too elementary in teaching statistics to agriculturists. From this point of view Dr. Finney has written a clear and authoritative introduction to the subject. Where he has possibly not been so successful is in having his elementary illustrations of arithmetical procedures keep pace with the more elaborate applications, for example, in experimental design and in correlation and regression. In a laudable desire to be comprehensive and mention such things as confounding, fractional replication and analysis of covariance, the author has somewhat degenerated into sketchiness. Ideas are conveyed, but the reader will not be able to design a moderately complex experiment for himself without having recourse, either to more comprehensive text-books or, as recommended so many times by the author, to a statistician. Nevertheless, more space is given to probability considerations, and the nature of significance tests and the like, than is usual in instruction manuals on field experimentation, and the book is very much to be welcomed on this account by the beginner.

J. W.

Hovanitz, W.
Textbook of genetics.
Elsevier Press, Inc., New York 1953 : 42s. 6d. : Pp. x + 419 : 267 figs. : 1 plate.

Professor Hovanitz, whose previous work has been mainly in the fields of chromosome structure and population genetics, presents us here with a textbook of genetics intended principally for advanced or graduate courses. He has succeeded in introducing within his 400-page compass a very large selection of genetic and cytological data and numerous examples and practical problems for the student to tackle. The first few chapters deal with Mendelism and statistics, whence we are led to chromosome structure, linkage, allelomorphic series, polymeric genes, chromosome aberrations and polyploidy. The concluding chapters deal with quantitative inheritance, selection, mutation, the mechanism of gene action, applied genetics and evolution.

The standard of exposition is the worst that the reviewer has yet encountered in a genetical textbook. Faults in spelling and syntax abound, e.g. in the table on pp. 370–72, and inconsequential statements such as "the first division of meiosis is called the first meiotic division" and "the mode of action of the gene when it expresses itself in a changed characteristic is the study of gene action" are rife. The reader is given little indication as to what statements are matters of fact and which merely suppositions. Thus, we are informed, without qualification, that "paleontology possesses the position of being able to show directly the connection of present-day living species with the plants and animals of the past. This it does by providing a series of intergradations between forms of the past and those of the present." We are further told that "genes affecting man are often very similar or 'homologous' with genes in the lower animals," and that "megasporogenesis (formation of megaspores [in plants]) is similar to oögenesis except for the terminology and final structure of the gamete."

The author appears to be hardly abreast of contemporary plant breeding practices. For instance, it is stated dogmatically that "for

commercial use, plants and animals are best when they are homozygous pure lines (with some exceptions, i.e. hybrids)." The treatment of breeding for disease resistance is perfunctory, and the reader is liable to infer from the statement that "strains which differ in disease susceptability are known as physiologic races" that the latter are found in the host, not the pathogen.

Recent fundamental work on the genetics of microorganisms is not included, but the very copiousness of the data provided by the author on classical genetics compensates to some extent for this omission; one can only regret that the reader stands little chance of absorbing this information to best advantage.

SÉGAL, J.
Mitchourine, Lyssenko et le problème de l'hérédité. **(Mičurin, Lysenko and the problem of heredity).**
Éditeurs Français Réunis, Paris 1951 : 225 Frs : Pp. 141 : 10 figs.

Dr. Ségal endeavours in this small booklet to present to French readers the main principles of the Lysenko-Mičurin school of genetics. He introduces the subject with a brief outline of the classical genetical standpoint, not failing to point out many of the inadequacies of the theory, for instance as an explanation of evolution; moreover Weismann's experiments were too crude to disprove the inheritance of acquired characters, and the mutation theory fails to provide a satisfactory basis since no useful mutations are known to the author. Daniel and Burbank are on better lines and an outline is given of the experiments of Mičurin with mentors and vegetative hybrids, and of Lysenko in phasic development and interspecific conversion (cf. *PBA*, Vol. XVI, p. 365). The degree of scientific accuracy of the book can be judged by statements such as that concerning colchicine, that the scientific world is now silent on the subject; or on hybrid maize production in the USA, in which respect he writes "Il s'agit donc d'une application directe des principes de Lyssenko, et probablement même d'une application consciente, puisque ses premières publications sur l'hétérosis datent de 1935 et 1936," apparently overlooking Shull's classical paper in 1910 and that of East and Hayes in 1912; or his singular assertions that rye-wheat and *Triticum-Agropyron* hybrids were produced only after Lysenko's development of the method of vegetative rapprochement, thus overlooking work reported on the subject in the USSR itself by Meister in 1930 (cf. *PBA*, Vol. I, Abst. 497) and by Cicin in 1933 (cf. *PBA*, Vol. V, Abst. 78). He very rightly criticizes geneticists for making no effort to repeat the experiments of Kammerer and others in proof of the inheritance of acquired characters, but makes no mention of the now numerous investigators who have attempted to repeat those of Lysenko and his followers, with negative results: in fact it is stated categorically that no such attempts have been made and Ashby and others are rated roundly for not having done so. This oversight is unfortunate since it reduces the force of an otherwise quite telling presentation of evidence for the transmission of acquired characters in bacteria, in which the words of Hinshelwood are aptly quoted, and of plasmatic inheritance of serological characters and adaptation in *Paramecium*; and of the contradictions in which writers such as Darlington and Lindegren have involved themselves by the idea of cytogenes, and Dobzhansky by his idea of the gene as "l'élément le plus instable, variant et se modifiant en tous sens même lorsque les conditions du milieu restent constantes" and his principle that "l'organisme est capable de s'organiser suivant un nombre illimité de manières. Parmi elles, il suit celle qui est la plus favorisée par le milieu extérieur."

BOURNE, G. H. & DANIELLI, J. F. (Editors)
International Review of Cytology. Volume II.
Academic Press Inc., New York 1953 : $11·00 : Pp. 545 : figs. : tables : plates.

The second volume in this series preserves the international character and high standard established by the first (cf. *PBA*, Vol. XXIII, p. 481).

The opening contribution, on Quantitative aspects of nuclear nucleoproteins by H. Swift, comprises not only a review of recently published material on a rapidly growing aspect of cytological research, but includes references to a great number of works that have not yet appeared in published form. A distinct note of caution is sounded in respect of the use and interpretation of data from photometric observations and dye binding. Gaps in present knowledge are pointed out and it emerges that DNA is the one constituent of chromosomes that shows the quantitative behaviour that might be expected from a carrier of genetic specificity. M. A. Lessler discusses The nature and specificity of the Feulgen nucleal reaction, referring to various modifications of the technique, including one of his own; he outlines current views on the chemistry of the reaction and on the specificity of the reaction, and concludes that the evidence

supports the concept that "only those DNA-protein complexes which remain fixed in the nucleus are available to subsequently condense with the leucofuchsin reagent to produce an insoluble colored complex at the original site of the DNA in the nucleus." In Alkaline phosphatase of the nucleus, M. Chèvremont and H. Firket outline some technical points to which attention must be paid in studying the localization of this substance in living cells; close correlations have been demonstrated between its presence and the degree of mitotic activity, and other evidence is also adduced to suggest that it is involved in the synthesis of deoxyribonucleoproteins during metaphase. D. Glick gives A critical survey of current approaches in quantitative histo- and cytochemistry, in which he attempts to evaluate some of the newer techniques that have been evolved for making quantitative estimations in cellular material, and points out some of their limitations. A. J. Dalton in Electron microscopy of tissue sections discusses various points concerning technique that have emerged in recent investigations in the author's own laboratory as well as in published papers, and shows how with improved techniques the electron microscope can contribute towards resolving cell ultrastructure and the finer structural detail of cell components which are barely visible with the light microscope. Other reviews include S. Mudd: Aspects of bacteria as cells and as organisms; J. F. Sutcliffe: Ion secretion in plants; W. L. Doyle: Quantitative histochemistry of phosphatases; and J. Hämmerling: Nucleo-cytoplasmic relationships in the development of *Acetabularia.*

BERTALANFFY, L. VON

Problems of life. An evaluation of modern biological thought.

C. A. Watts & Co., London 1952 : 25s. : Pp. xi + 216.

Holistic theoretical systems have come much into vogue in recent years, not only in biology, but also in psychology and philosophy. Professor Bertalanffy has been one of the most active exponents of an "organismic" outlook in biology and the present book, a translation from his German work *Das Biologische Weltbild,* provides a welcome introduction in English to the author's views.

Problems of Life is hardly a comprehensive account of the "present situation of biological theory, comprising all main fields such as physical chemistry, cytology, embryology, genetics, physiology, ecology, evolution, etc.," as the publisher's blurb would have us suppose, rather it is a discussion of selected topics in the light of the author's theory of organism; the examples are almost wholly zoological.

The author's thesis is that many of the most important properties of an organism derive essentially from the interrelations of the properties of its parts, not from their summation. Secondly, organisms are hierarchical structures, the molecular level being subordinated to the cellular and organ levels and the whole organism possibly forming a part of a biocenosis, which itself can be regarded as, in some sense, an organism. What is regarded as an essential characteristic of organisms is that they are open systems, that is, they exchange matter with their environment yet maintain themselves in a steady state. We are thus led to a definition of an organism as a "hierarchical order of open systems which maintains itself in the exchange of components by virtue of its system conditions." The legitimacy and usefulness of these conceptions is urged with both force and subtlety and the inadequacy of a great deal of analytic and particulate modes of thought in biology is convincingly exposed.

It is not surprising that the author criticizes the tendency to interpret heredity too exclusively in terms of gene action, and expresses sympathy with the more holistic attitude of Goldschmidt. He also presents us with a considered critique of the attitude which seeks to interpret evolution almost entirely in terms of selection. The mental attitude which apparently feels some inner compulsion towards explanations so restricted is compared by the author to a Tibetan prayer-wheel, and in discussing this attitude, the author shows clearly how considerations entirely removed from questions of fact may decide the kind of scientific hypothesis advanced in any particular circumstance. In connexion with evolutionary tendencies, it is pointed out that the presupposition that complexity in morphological construction and life history has developed because of its selective value is almost devoid of supporting evidence. This healthy scepticism expresses itself in the author's remarks on the life history of *Ascaris* in which the young larvae "enter the intestine with the food . . . pass through the intestinal wall into the blood and into the circulatory system, through the portal vein into the liver, then into the lung and throat, where they must be again swallowed, to arrive back, at the stage of sexual maturity, in the intestine, where, in our humble opinion, they could quite well have remained." On this same topic, the author points out that genetic variation is only random

within certain limits determined by the general organization of the individual, and that this restriction on the range of variation may be responsible for some orthogenetic trends.

The importance of a holistic approach in biology is now generally conceded, but it is not altogether clear in what respects the author's approach does represent a positive advance over other treatments. Much play is made of the inadequacies of Cartesian mechanism and the later forms of vitalism, but none of these points of view is presented to its best advantage. Similarly, the dynamic aspect of life, which is emphasized in the author's theory, is not unknown to earlier writers, and to describe Aristotle's notion of potentiality as static and dualistic is hardly doing justice to Aristotle's treatment, especially as the word used by Aristotle for potentiality is *dynamis*. A more serious objection to theories of organism is that, when they do differ more than verbally from other approaches, they are liable to be carried away by their own abstractions. Thus we read that the cell is "the fundamental unit of life," from which the inference is drawn that the acellular mode of construction of the *Siphonae* "has obviously not stood the test"; it seems likely that it has stood the test for a longer geological period than many types of cellular construction. Also, one is not impressed by the argument that the widespread development of organismic concepts in recent years in diverse circumstances "can mean nothing else than that these common general concepts are essentially true and unavoidable."

The profundity of the author's thought is not adequately supported by the style of presentation. The translation is into laboured English, and sometimes does not even reach English at all, for example *mille* for *thousand* on p. 83 and *natrium* for *sodium* on p. 147. The referencing is highly annoying. No literature sources are given for many of the authors quoted, and those that are given have to be sought out of seven alphabetical lists very tenuously differentiated from one another.

James, W. O.
Plant respiration.
Oxford University Press, London 1953 : 30s. : Pp. ix + 282 : 66 figs. : 42 tables.

In spite of some eighty years of intensive research, plant respiration is still a highly obscure topic, and the tortuous history of the hypotheses advanced as to its nature is sufficient indication of the difficulties that confront its investigators. Mr. James, who has worked for many years in this field, has now brought out a monographic review of the subject which will prove of great value to all biologists wishing to ascertain the present state of knowledge on respiration in the higher plants.

The aspects considered are respiration rate and the effect of temperature, respiratory drift during development and aging, the respiratory quotient, respiratory substrates and the role of phosphorylation in carbohydrate interconversion, the yeast fermentation cycle, anaerobic respiration and its relation to aerobic respiration, oxidases, dehydrogenases, cytochromes and the ascorbic acid system, and the connexion of respiration with other physiological processes. The classical branches of the subject are thus dealt with comprehensively. Practical applications such as concern fruit and vegetable storage are only mentioned; genetical and taxonomic variation in respiratory activity and content of respiratory enzymes also receives no more than a passing reference.

It is interesting to see, in plant physiology as in genetics, how the most amenable organisms for fundamental research appear to be the fungi. The mechanism of fermentation in yeast is perhaps the most thoroughly worked out of all catabolic systems; our knowledge of the stages of aerobic respiration in higher plants, on the other hand, in spite of all the studies that have been lavished on it, is still fragmentary in the extreme. However, this is perhaps not so serious a deficiency as might have been supposed if the author's supposition is correct that "the continuous destruction of carbohydrate and liberation of heat in the respiration of higher plants may be to a very large extent wastage, similar in kind—though less in degree—to the changes occurring when yeast gets into a sugar solution or a bull into a china shop." Yet, knowing that a manifesto on the wickedness of teleology, garnished with appropriate excerpts from Bacon, is still regarded as the hallmark of plant physiological respectability, perhaps we may regard the author's remark more as a graceful gesture to conventional expectations than as a belittlement of the importance of a subject on which he has written so temperate and thorough an account.

Yegna Narayan Aiyer, A. K.
Principles of crop husbandry in India.
The Bangalore Printing & Publishing Co. Ltd., Bangalore 1953 : 2nd ed. : Rs. 17-8 : Pp. xxviii + 550 : tables : plates.

In view of the paucity of popular textbooks on agriculture in India, this volume helps to fill

many gaps in the availability of information for students, teachers, administrators and others interested in the more practical aspects of the crop husbandry of that country and in the general task of increasing production. The author writes from firsthand and extensive experience, since he was formerly Director of Agriculture in Mysore and has travelled extensively not only in India but in the United States and other countries. The scope of the book is wide, the twenty-five chapters dealing with: climatic factors in Indian agriculture; soils in general; the soils of India; soil moisture and its conservation; soil microorganisms; irrigation; drainage; general aspects of tillage; methods and implements of tillage; manures and manuring (three chapters); seeds and sowing; crop rotation; mixed cropping; weeds and weed control; dry farming; soil erosion and methods of control; the protection of crops against pests, diseases and other hazards; improved varieties in relation to crop production; implements and machines; use of the tractor; preparation and storage of produce; systems of farming and choice of farms; and lastly, some aspects of crop husbandry as a commercial undertaking. As the author points out in his preface, in treating his subject matter he has adopted a middle course so as to make the book useful to as large a section of the Indian public as possible. Specialized knowledge has therefore been restricted to a minimum and general underlying principles have been emphasized. It can be said that he has succeeded in his aim, usually maintaining a felicitous blend of a popular style of presentation, elementary scientific knowledge and a predominantly practical approach. Primitive methods and implements on the one hand and modern labour-saving techniques and machinery on the other are treated in a balanced manner, in keeping with the realities of the agricultural situation in India and with the nature of the social and economic changes involved in increased mechanization. The edition reviewed here is the second: the first edition was published in 1948. The present edition contains a few additions, such as the note (appendix III) on the use of electricity in crop production, information on hydroponics and references to some of the newer insecticides and fungicides on the market. A few changes have been made in the illustrations. The second edition is illustrated by 48 photographs and line drawings of average standard.

LAWRENCE, W. J. C.
Guida pratica alla genetica vegetale. (**Practical plant breeding**).
Edizioni Agricole Bologna : 800 Lire : Pp. 158 : 42 figs.

This Italian translation of the third edition of Mr. Lawrence's book published in 1951 (cf. *PBA*, Vol. XXII, p. 466) has been made by Dr. Giuliano Puccini. A certain number of changes have been made in the text and in the illustrations to make them more appropriate for Italian readers and certain references to Italian literature that were not in the original have been added as footnotes. Otherwise the Italian version sticks fairly closely to the English text. The translation is easy, elegant and on the whole accurate, apart from a few accidental slips such as *piante erbacee* for grasses on p. 2 and *patata* for tomato on p. 11. Occasionally lack of knowledge of English idiom has altered the sense, as in rendering "so long as a fair number are kept" by *"finchè non si sarà ottenuto"* on p. 86, or the rendering of "every other one" by *"quasi tutti"* on p. 99, or "hearting" by *"vigore"* on p. 122. A certain confusion may arise through the apparently indiscriminate use of different terms such as *genetica vegetale*, *ibridazione*, *incrocio*, *coltivazione*, *miglioramento*, *allevatore*, and *agricoltore* to render the expressions plant breeding or plant breeder, although it has of course the advantage of relieving the monotony of the literary style, and one can safely say that Mr. Lawrence has been fortunate in his translator. In its attractive presentation and appearance, and in typographical accuracy, the Italian edition is distinctly superior to the original.

6e beschrijvende rassenlijst voor groentegewassen (inclusief vroege aardappel, aardbei, tabak, geneeskrachtige en aromatische kruiden). [**Sixth descriptive variety list for vegetables (including early potatoes, strawberries, tobacco, and medicinal and aromatic herbs)**].
Inst. Vered. Tuinbouwgewassen. Wageningen 1954 : f. 1·75 : Pp. 177 : figs. : tables.

This is the 1954 issue of a publication reviewed in *PBA*, Vol. XX, p. 369 and Vol. XXIII, p. 486. Several sections have been partially revised and the name of the producer has been included for a number of the newer varieties. The sections on peas and beans contain a list of diseases attacking these crops.

BROWN, C. H.
Egyptian cotton.
Leonard Hill Ltd., London 1953 : 16s. : Pp. xi + 174 : 21 figs. : 5 tables.

The author is well-known for his cotton-breeding work as a former member of the staff of the Botanical Section of the Egyptian Ministry of Agriculture. He joined the Section in 1921, soon after its formation in the previous year, and took over the breeding in 1925. His long service for the Ministry came to an end in 1951 when he was forced, together with other English scientists, to give up his work because of the political situation. As Sir Ralph Lacey, Chairman of the Raw Cotton Commission, ironically writes in his foreword, the decision of the Egyptian Government to dispense with his services and experience has at least had results which are not wholly bad, whatever the repercussions on the future course of the cotton industry in Egypt itself. Mr. Brown's services have become available to other cotton-growing countries, and he has had the opportunity of writing this useful book, surveying the various aspects of the cotton industry in Egypt from the perspective of thirty years' research.

In Chapter 1 the general background of the industry is filled in, Chapter 2 outlines the history of the crop and Chapter 3 describes its present-day cultivation. Chapter 4 completes the general agricultural picture by an account of the diseases and pests. In Chapter 5 the account is continued by information on the organization of the research and other activities undertaken by the Ministry of Agriculture since its establishment in 1912, in connexion with the cotton crop. In the next four chapters, Mr. Brown enters into his own particular field, giving a detailed account of breeding, the procedures of seed production, the methods of testing used in evaluating reselections and new hybrid selections, and past and present varieties. Some readers, particularly those with little specialist knowledge, may find these chapters heavy-going since the exposition is at times not always as clear as it might be, even allowing for the intricacy of the subject. But these chapters are well worth close reading and give a much-needed over-all account, not available elsewhere, of cotton breeding in Egypt during the past three decades. In sharp contrast to breeding in the Sudan, where the aim has been to incorporate, by back-crossing, desirable genes into the commercial cottons and at the same time to maintain continuity in the general types, breeding policy at the Giza Research Farm in Egypt has been the production of a large number of varieties, the origin of most of which can be traced back to Ashmuni and Sakel, and commercial cultivation has been characterized by a continual change in varieties, each of which has met a genuine economic need during its span of commercial circulation. In chapter 10, the author turns to the economic organization of the industry. In chapter 11 a survey of the production of *Gossypium barbadense* cottons in other countries is provided. In the twelfth and final chapter, Mr. Brown sums up his views on some aspects of the present position of the industry in Egypt, discussing the possible outcome of the decree of 1952 limiting individual land-holdings, the effect of the restrictive quota imposed by the United States on the import of long-staple cotton, the question of propaganda to widen the market for Egyptian cotton, the role of research and, lastly, Government economic policies. Throughout his book, Mr. Brown writes critically where he thinks necessary, but always constructively and never with rancour. Not without justification, he attaches great importance to breeding, believing that the production of improved varieties has been the chief factor responsible for the strong position the country now occupies in the world production of cotton. In his recent book on cotton in Egypt, *The yields of a crop*, Dr. W. L. Balls also emphasized the important role of better varieties, but reached the conclusion that the increases in production due to the use of higher yielding varieties, pest control, manures and other measures have in fact only masked a downward trend in yield in the Delta during the last half-century, as the result of a growing deterioration in soil conditions caused by a rising water table (cf. *PBA*, Vol. XXIII, pp. 667–8). Mr. Brown dismisses the problem of the water table in these words: "Much discussion centred, in the earlier days of research, on the rise in the water-table caused by the spread of perennial irrigation. Modern varieties are picked and pulled up much earlier than they used to be, when picking in November was common, and it is not now generally thought that the rising Nile has any direct influence in limiting the crop." (p. 18). There is perhaps more room for controversy on this particular topic than Mr. Brown allows.

HADFIELD, J. W.
Linen flax fibre production in New Zealand.
NZ Linen Flax Corp. & NZ Deps. Agric., Indust. & Comm., & Sci. Indust. Res. 1953 : Pp. 125 : 53 figs. : 13 tables.

The production of fibre flax in New Zealand

during the second world war, to supply Britain, was one of the many economic dramas of that period. In June 1940, after the German invasion of the Netherlands, the British Ministry of Supply requested the New Zealand Government to grow 15,000 acres of fibre flax in the 1940–41 season, at the same time offering to supply 500 tons of seed, mainly of the variety Concurrent: the New Zealand Government agreed to this request and accepted the offer of seed. An agreement was subsequently reached whereby New Zealand undertook to grow fibre flax on behalf of the British Ministry of Supply for the period of the war and one year after. The author played a leading part in flax production in New Zealand during the war years, as director of Linen Flax Development. Since the end of the war, during the period 1946–48, as general manager of the Linen Flax Corporation set up in 1945, he has also been concerned with the problems of establishing a reduced peace-time industry. In part I of his informative and clearly written booklet, he gives an account of the exciting story of the launching of a whole new industry at short notice, with no buildings, hardly any technical equipment and with only three years' experience of growing flax on an experimental scale. Sowing on 13,000 acres commenced four months after the request of the British Ministry of Supply and the first season's crop was duly harvested in January 1941, a triumph of initiative and organization. Although not suitable for spinning the finest yarns, the flax grown in New Zealand contributed substantially to Britain's war-time supply of strong medium grades. The author also reviews the course of the industry since the end of the war: the status of this industry is now uncertain owing to various economic factors. Part II provides an account of fibre flax cultivation and Part III describes the operations involved in processing the crop, against the background of experience in other countries. Well-chosen photographs illustrate the booklet.

PETELOT, A.
Les plantes médicinales du Cambodge, du Laos et du Viêtnam. (**The medicinal plants of Cambodia, Laos and Viêtnam**).
Arch. Rech. agron. Cambodge Laos Viêtnam 1952 : 1 : No. 14 : Pp. 408.

Since the publication of the "Catalogue des Produits de l'Indochine, Produits Médicaux" by the late Charles Crevost in collaboration with M. Alfred Petelot, the latter author has collected a vast quantity of further information on the medicinal plants used in Indochina and in neighbouring countries, especially India, China and the Philippines. Recent botanical expeditions have been to the high-lying and temperate regions of northern Viêtnam and Laos, whose flora exhibits marked affinities with that of southern China, and, to some extent, with that of northern India. These were also the regions visited largely by the Chinese for a large part of their own medicinal supplies.

M. Petelot has found time, in the course of his work as Lecturer of the Faculty of Medicine and Pharmacology and Head of the Botanical Division of the Centre for Scientific and Technical Research at Saigon, to compile four volumes on medicinal plants, of which the first has now been published. Arranged according to Bentham and Hooker, Vol. I covers the section Ranunculaceae—Cornaceae; Vol. II (about 350 pp.) will comprise the section Caprifoliaceae—Plantaginaceae, and Vol. III (about 350 pp.) the section Amarantaceae—ferns. Vol. IV (about 350 pp.) will contain therapeutic tables with the botanical, common, vernacular and Chinese names of the various species. The vernacular names cited have been limited as far as possible to those known to be correct.

As some of the scientific names of species differ from those adopted by other authors, synonyms have been as fully listed as possible, and in this connexion the "Flora Générale de l'Indochine" and E. D. Merrill's "A Commentary on Loureiro's Flora Cochinchinensis" have been freely used.

As research is not yet sufficiently advanced to give a modern pharmacological classification of the local drugs, the various plants have been classed according to the reputed medicinal or other uses to which they are put in Cambodia, Laos or Viêtnam, with amplifications, on occasion, from other sources, e.g. I. H. Burkill's "Dictionary of Economic Products of the Malay Peninsula."

Each species receives a short description, based almost exclusively on the vegetative organs, but, in most cases, adequate to enable the species to be readily identified. For complete botanical diagnoses, reference can be made to the Flore Générale de l'Indochine.

Students of pharmacology, chemistry and medicine, many of whom have been evincing an interest in the plants and drugs used for centuries by the peoples of the Far East, must recognize their debt to M. Petelot in undertaking the compilation of this extensive work of reference—a feat which, as he implies, has not been achieved without difficulties in recent times.

The peanut—the unpredictable legume. A symposium.
The National Fertilizer Association, Washington, DC 1951 : Pp. viii + 333 : figs. : tables.

It is only during the course of the last few decades that the groundnut has achieved its present eminent position as one of the major oil-producing crops of the world. This rapid development may partly account for the current shortage of reliable and comprehensive literature on its cultivation, breeding and genetics, which have been neglected in comparison with works available on cereals, forage plants and other crops. The symposium under discussion, containing as it does a detailed and factual, if somewhat overlapping, collection of articles on all aspects of groundnut cultivation, should go a considerable way to meeting the need for a comprehensive manual on the subject. An attempt has been made to include all that is already known on the crop, and the selected references appearing at the end of each article provide a reference to other literature of value. In the opening chapter, B. B. Higgins, of the Georgia Agricultural Experiment Station, discusses the economic importance of the groundnut, and traces the history of its cultivation in the USA from Colonial days to the present time. Detailed information on types and varieties grown, the utilization of the crop and the nutritional value of the plant are given. In the opinion of the writer, the increased production of peanut oil offers the best possibilities for the early and permanent relief of the world shortage of edible fats and oils. The second article, also by B. B. Higgins, deals with the origin and early history of the groundnut and reviews different theories on the subject. The most likely possibility is that the plant originated in South America and was carried thence to Africa and the East Indies by the early Portuguese and Spanish traders. Chapter III, by W. C. Gregory, B. W. Smith and J. A. Yarbrough, is concerned with morphology, genetics and breeding. A detailed study of the growth, branching habit, flowering system and general appearance of the plant is followed by an account of the reproductive mechanism and a survey of the problems encountered in breeding improved varieties, including the sterility barrier. The groundnut is classified according to its different types and varieties, features distinguishing the various types are indicated, morphological details given and a botanical key to the various groups of varieties is provided. Little success has been achieved in breeding improved varieties and this is attributed partly to the difficulties involved in the material itself and partly to reduplication of work due to the conspicuous lack of coordination between plant breeders in this field and to the lack of references in the literature on the subject. The writers attempt to make up for the latter by themselves reviewing the available literature on breeding techniques and aims, inheritance studies and disease resistance, including varietal differences in resistance to certain diseases.

Other chapters deal with physiology and mineral nutrition, soil properties, fertilization and maintenance of soil fertility, cultural practices, insect pests and diseases.

As may be gathered from the above, there is hardly any aspect of groundnut cultivation not covered by this symposium. The whole is written in an interesting manner and the book should prove valuable to all those concerned with the subject. Purchasers outside the USA are asked to apply for copies through a book seller.

HUME, H. H.
Hollies.
Macmillan Co., New York 1953 : $6·75 : Pp. xi + 242 : plates.

The genus *Ilex* is widely distributed and runs to several hundred species; many of these have been interwoven with human affairs from ancient times. In this book the author surveys the genus from a botanical and horticultural standpoint, but with many interesting sidelights on historic and anthropological aspects.

More than 30 species are described, with emphasis on those native to and cultivated in the United States. Special chapters are devoted to the numerous horticultural varieties of *I. opaca* and *I. aquifolium*, and Chinese and Japanese hollies are also treated separately. Much confusion as to the nomenclature and taxonomic status of varieties could have been avoided, the author points out, if the use of Latin names was restricted to genuine botanical varieties instead of being extended to many purely horticultural forms, and it is recommended that this latter procedure should be discontinued.

A chapter is devoted to the caffeine hollies, *I. vomitoria* of the southern USA and *I. paraguariensis* of South America, the source of maté. Here much interesting detail is given of the beverages made by indigenous tribes, with firsthand descriptions of the attendant ceremonials.

Of particular interest to the American reader are the descriptions given of individual holly trees in the USA with a particular claim to fame. The latter chapters of the book are practical, and deal exhaustively with horticultural methods of propagation, pollination, pest control and planting, whether in gardens or by commercial growers.

The whole is pleasingly presented with many excellent photographs. R. H. R.

SCHOBER, R.

Die japanische Lärche. **(The Japanese larch).**

SchrReihe Forstl. Fak. Univ. Göttingen 1953 : 7/8 : Bound DM 16·80, cardboard DM. 15 : Pp. xii + 212 + 46 : 82 figs. : 55 tables.

Larix leptolepis, the Japanese larch, has proved one of the most successful exotic introductions into European forests; perhaps its most valuable characteristic, in comparison with *L. decidua*, the European larch, is its high degree of resistance to canker (*Dasyscypha willkommii*). The present volume, by Professor Schober of the Forestry Faculty of the University of Göttingen, provides a useful account of the behaviour of this species in Europe and more particularly in Germany. The book deals with the following aspects: the geographical distribution and ecology of *L. leptolepis* in Japan; European plantations; resistance to canker, *Phomopsis pseudotsugae*, butt rot, *Armillaria mellea*, insects, drought, frost and mechanical injury; sylvicultural management of pure and mixed stands; and growth rate, bole shape and timber production. A mimeographed appendix records growth and yield data in many German and some other localities.

Matters of immediate interest to forest tree breeders are treated in section D of chapter V, *Provenienzen und Bastarde*. Sporadic observations on the variation encountered in European stands suggest that racial differences might well exist and that provenance studies would probably be of interest. The author is impressed by the growth rate of F_1 hybrids between Japanese and European larches, but advises caution in their planting till more is known of their reaction to canker.

Tuinbouwgids 1954. **(Horticultural guide 1954).**

Uitgave der Directie van de Tuinbouw, Den Haag 1954 : f5 : Pp. xii + 704 : figs. : tables : plates.

The 1954 edition of this guide (cf. *PBA*, Vol. XXIII, p. 345) has been compiled on much the same lines as previous numbers, and maintains the same high standard. Sections are included on the management and planning of market gardens, fertilization and irrigation, and the combating of plant diseases. The numerous illustrations of damage caused by various pests and diseases are particularly impressive.

For the foreign reader, the glossary at the end, with its English, French, German and Swedish equivalents of Dutch terms, should prove of considerable value, whilst the excellent and comprehensive system of indexing renders the mass of highly detailed and concentrated information contained in the work easily accessible.

NEW JOURNALS

Revista Agronómica del Noroeste Argentino.

The main object of this new Argentine journal is to publish the results of investigations performed by the Faculty of Agronomy of the University of Tucumán, though works by other authors will be accepted if they deal with topics related to the agricultural problems of the Northwest of Argentina. The first number is devoted to the sugar cane borer (*Diatraea saccharalis*) in Tucumán (cf. Abst. 1308). Correspondence should be addressed to the Facultad de Agronomía, Casilla de Correo 125, San Miguel de Tucumán, Argentina.

De Surinaamse Landbouw.

With the growing importance of agricultural research in Surinam, the need for a journal dealing with the various aspects of the development of crop plant cultivation, livestock and horticulture has been met by the publication of the bi-monthly journal in Dutch, *De Surinaamse Landbouw* [*Surinam Agriculture*]. The intention is to disseminate information and to stimulate discussion among research workers, agriculturists and fruit growers.

Articles of interest to plant breeders have been abstracted in the current issue of *Plant Breeding Abstracts* (cf. Absts. 1319 and 1409).

Subscriptions, Sf. 5. per annum, should be addressed to de Redactie-Secretaris van "De Surinaamse Landbouw," Landbouw-proefstation, P.O.B. 16a, Paramibo, Surinam.